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TOME 161

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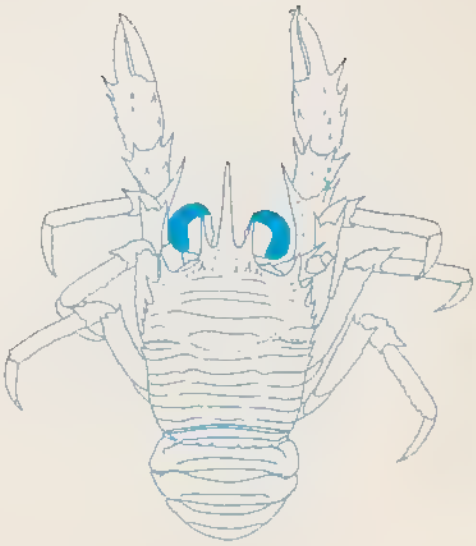
Volume 12



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Alain CROSNIER

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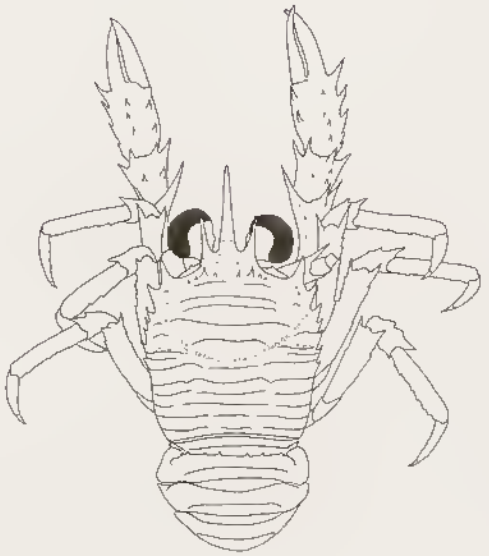

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The CALSUB cruise on the bathyal slopes off New Caledonia

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ABSTRACT

The CALSUB cruise took place in 1989 off the coast of New Caledonia. The diving saucer *Cyana* enabled the exploration of the bathyal environment from the edge of the coral platform down to a depth of 3000 m. In this paper an account is given of how the study was carried out, along with the material gathered during the course of the study which may be consulted (in particular the photographs and the videos). The various sectors explored, and the principal observations made are discussed. Apart from the wide diversity of ecological niches observed, what makes this sector of the Pacific Ocean original, is the existence of bathyal benthic communities rich in "living fossils", giving us an idea of the fauna which populated the Tethys Ocean during the Mesozoic. The use of the *Cyana* diving saucer allowed direct observation of the nature of the sea beds and the associated fauna, in particular of rocky slabs, and environments affected by deep currents, where fields of hydraulic bioclastic dunes develop along fault scarps covered with dense populations dominated by Echinoderms. We were able to establish the bathymetrical distribution of the bathyal populations.

RÉSUMÉ

La campagne CALSUB sur les pentes bathyales de la Nouvelle-Calédonie.

La campagne CALSUB s'est déroulée en 1989, au large de la Nouvelle-Calédonie. Elle a permis une exploration, à l'aide de la soucoupe plongeante *Cyana*, de l'environnement bathyal, depuis la bordure de la plate-forme corallienne jusqu'à près de 3000 m de profondeur. On présente ici le déroulement de la campagne, les documents recueillis susceptibles d'être consultés (notamment les photographies et les vidéos), les différents secteurs explorés, et les principales observations effectuées. Outre la grande diversité des niches écologiques observées, l'originalité de ce secteur de l'océan Pacifique réside dans la présence de communautés benthiques bathyales, riches en "fossiles vivants" et évoquant celles qui peuplaient la Téthys au cours du Mésozoïque. L'utilisation de la soucoupe *Cyana* a donné accès à l'observation directe des fonds et des associations fauniques, et particulièrement, d'environnements sur dalles rocheuses et de ceux parcourus par des courants profonds où se développent des champs de dunes hydrauliques bioclastiques le long d'escarpements de faille couverts de peuplements très denses dominés par les échinodermes. L'étagement bathymétrique des peuplements bathyaux a pu être précisé.

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INTRODUCTION

The exploration of the deep sea fauna of New Caledonia began with test cruises from 1977 to 1979 on beds ranging in depth from 200 m to 1000 m off the coast of Grande Terre, off the Isle of Pines and off the Loyalty Islands (INTÈS, 1978). As of 1985, the scope of the exploration was widened and intensified within the framework of the MUSORSTOM cruise program (RICHER DE FORGES, 1990) and the ENVIMARGES program (ROUX, 1991), which enabled sedimentologists, paleontologists and biologists to collaborate.

As the MUSORSTOM cruises developed, paleontologists began to play an important role in the study of the material gathered. The "living fossils" theme, at the forefront since MUSORSTOM 1, led by J. FOREST (1981), which set out to find new examples of the only living representative of the glypheid crustaceans, *Neoglyphea inopinata*, was reinforced when the MUSORSTOM cruises moved from the Philippines to New Caledonia. With the ENVIMARGES program, the widening of interdisciplinary cooperation was aimed at improving understanding of the ecological and geodynamic factors which, in the course of geological history, have enabled the survival of ancestral forms amongst the current bathyal fauna of the Western Pacific and, in particular, the fauna of New Caledonia.

The ENVIMARGES program, overseen by the INSU-CNRS with the support of TOTAL-CFP, concentrated primarily on a transect perpendicular to the axis of the basin of the Loyalty Islands from Thio to the west and the north-west of Lifou. Two complementary sectors were also studied : the slope situated to the south of Nouméa and the slope situated between the Isle of Pines and the large southern reef, reasonably regularly inclined towards the south-east. This program was carried out by three separate cruises : BIOCAL, BIOGECAL and CALSUB.

FIG. 1. — Recovery of SP 3000 *Cyana* at the end of a dive during the CALSUB cruise.
FIG. 1. — La SP 3000 *Cyana* récupérée à la fin d'une plongée de la campagne CALSUB.

In 1985, during the BIOCAL cruise on board the R/V *Jean Charcot* (mission led by Claude LÉVI), five sectors of the bathyal slope (SB 1 to 5) were mapped using the multibeam sounder, Sea Beam. Samples of sediment (using the Kullenberg and Usnel coring systems) and fauna (using beam trawls and Warren's epibenthic dragnet) were also taken. In 1987, the BIOGECAL cruise, on board the R/V *Coriolis* (mission led by Pierre COTILLON) enabled the

Source : MNHN, Paris

completion of the sedimentary and biological sampling of the transect on flat ground and moderate inclines. Finally, in 1989, the CALSUB cruise, on board the R/V *Suroît* (mission led by Michel ROUX) used the *Cyana* diving saucer (fig. 1) to explore the steeper and rockier beds. Moreover, a liaison with the PROPPAC program, conducted by ORSTOM (Study of the effects of climatic variation on pelagic production in the high seas of the SW Pacific) allowed us to obtain samples of plankton in order to study the current nannoflora between 20°S and 10°N by 165°E, and thereby to compare this to the fossilised calcareous nannoplankton in the Quaternary sediments of the Loyalty basin.

The principal results of the ENVIMARGES program, with special reference to the Earth Sciences, have been compiled in a special, illustrated report (LAMBERT & ROUX, co-ordinators, 1991), which biologists will be able to consult usefully.

THE CALSUB CRUISE AND RESULTING DOCUMENTATION

1. - Summary of how the cruise was carried out

The CALSUB cruise took place between 18 February and 13 March 1989 and consisted of two legs. Twenty-two dives were made (fig. 2) from the outer edge of the platforms to the abyssal zone at a depth of around 3000 m (fig. 3; table 1).

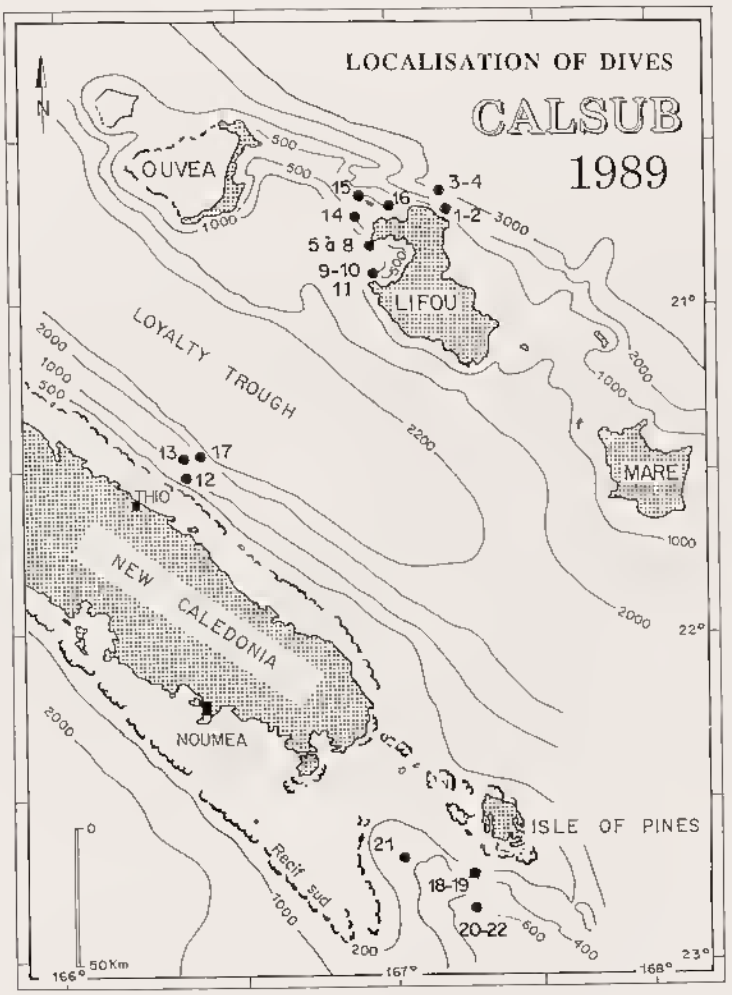


FIG. 2. — Location of *Cyana* dives conducted during the CALSUB cruise.

FIG. 2. — Localisation des plongées *Cyana* de la campagne CALSUB.

Source : MNHN, Paris

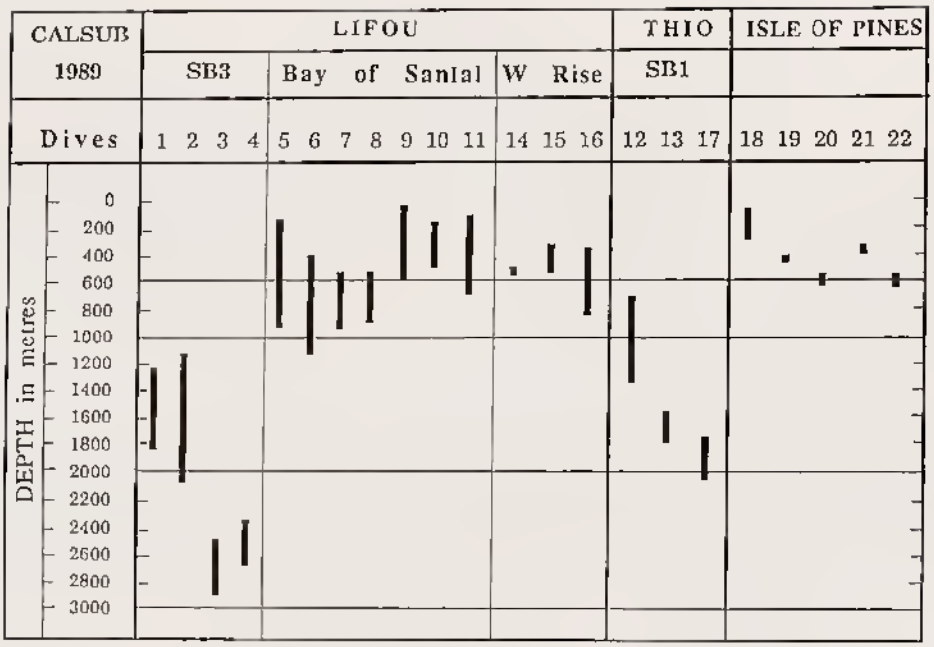


FIG. 3. — Bathymetric range of dives into different areas invesligated.
FIG. 3. — Etagement bathymétrique des plongées dans les différents secteurs explorés.

Four areas had been chosen : (1) the region to the NE of Lifou, including the area shown on the Sea Beam map SB3; (2) Sea Beam map SB 1 off the coast of Thio; (3) the basin which runs between the Isle of Pines and the Great Southern Reef; (4) Stylaster Bank, a guyot situated to the SE of the Isle of Pines. As for the areas which had not been mapped during the BIOCAL cruise, we were able to benefit from readings taken by the Marine Hydrographic Service of Nouméa in Santal Bay (to the W of Lifou) and on the SE edge of the Isle of Pines.

The initial dive program was changed during the course of the cruise because of the rough condition of the sea which often only allowed us to dive in sheltered sectors. Santal Bay and the Ouvéa-Lifou rise (10 dives), as well as the basin situated to the SW of the Isle of Pines (5 dives), were explored more intensively than initially intended, whereas the number of much deeper targets was reduced (SB 1 and SB 3), and the plan to dive on the Stylaster Bank had to be abandoned. Thanks to the excellent cooperation between the crew of the *Suroît* and the technical team of the *Cyana* saucer, we were able on a number of occasions to make two dives in a single day to targets of a moderate depth.

The scientific team of each leg was composed of 6 members of the Ecoprophyce Research Group of the CNRS and one guest from the ORSTOM centre in Nouméa. Michel ROUX (Earth Sciences Laboratory, University of Reims), who led the cruise, was involved in both legs. The first leg, from 18 February until 1 March, brought together Jean-Paul BOURSEAU and Michel RIO (Centre for Earth Sciences, University of Lyon), René GRANDPERRIN (ORSTOM, Nouméa), Bernard LAURIN (Centre for Earth Sciences, University of Dijon), Claude MONNIOT (National Natural History Museum, Department of Invertebrate Marine Biology, Paris) and Jean VACELET (CNRS, Marine Station at Endoume, Marseille). The second leg brought together Philippe BOUCHET and Alain GUILLE (National Natural History Museum, Department of Invertebrate Marine Biology, Paris), Christian GAILLARD (Centre for Earth Sciences, University of Lyon), Bertrand RICHER DE FORGES (ORSTOM, Nouméa), Michel SEGONZAC (IFREMER, Brest) and Helmut ZIBROWIUS (CNRS, Marine Station at Endoume, Marseille).

Each dive produced the following documentation : (1) a complete video recording on VHS tape; (2) several hundred photographic slides; (3) a detailed report written by the diver once back on board. Umatic video sequences, which are of very high quality, were only occasionally taken; they have been converted to VHS, thereby making them easier to consult.

Source : MNHN, Paris

The sampling capacity of the *Cyana* saucer is limited, particularly when working on steep slopes. This was improved by using autonomous shuttles (lifts) and ballasted sampling cans carried aboard the saucer. The big draw-lift was only used on the first dives at the deepest site (SB 3). Its ability to carry baskets of dimensions 60 cm x 40 cm x 30 cm enabled us to collect complete specimens of some size (sponges, stalked crinoids). A double-box lift, which is more maniable, was more frequently used.

In general, this lift was placed halfway along the route : we placed in it a ballasted can full of samples taken during the first part of the dive, substituted by an empty can used during the second part. Moreover, one of the boxes is capable of keeping large specimens collected nearby. When the lift could be cast off in the evening, around 10 or 12 hours before a dive, bait (tuna, chicken) was attached to the ballast and protected from sharks by wide-meshed wire netting. It was in this way that nautitids and various crustaceans could easily be observed and, in some cases, even captured.

Since the suction system did not function properly, we were unabte to cotlect small macrofauna, despite its abundance on certain epibathyal beds.

On board, a few samples were prepared and conserved in liquid nitrogen, with a view to performing comparative phylogenetic analyses, using information provided by ribonucleic acid (RNA) sequencing.

N° CALSUB	N° CYANA	DATE 1989	LOCATION New Caledonia	DEPTH in metres	OBSERVER
N of Lifou SB3					
01	1016/22	19/2	20°38'S/167°13'E	1863 à 1228	C. Monniot
02	1017/23	21/2	20°37'S/167°14'E	2191 à 1130	M. Roux
03	1018/24	22/2	20°36'S/167°13'E	2885 à 2465	M. Rio
04	1019/25	23/2	20°35'4S/167°12'E	2697 à 2380	J. Vacelet
W of Lifou and N of the Bay of Santal					
05	1020/26	24/2	20°47'S/167°01'E	954 à 130	R. Grandperrin
06	1021/27	24/2	20°48'S/167°02'4E	1150 à 400	B. Laurin
07	1022/28	25/2	20°48'S/167°05'E	970 à 489	J.P. Bourseau
08	1023/29	26/2	20°48'3S/167°05'E	880 à 516	B. Laurin
W of Lifou and S of the Bay of Santal					
09	1024/30	27/2	20°53'S/167°03'E	602 à 70	J. Vacelet
10	1025/31	28/2	20°53'S/167°03'E	480 à 170	C. Monniot
11	1026/32	28/2	20°52'5S/167°03'E	681 à 120	J.P. Bourseau
Thio SB1					
12	1027/33	3/3	21°28'S/188°21'5E	1265 à 700	H. Zibrowius
13	1028/34	4/3	21°26'S/166°22'7E	1807 à 1567	M. Segonzac
Between Lifou and Ouvéa					
14	1029/35	5/3	20°38'S/166°56'6E	570 à 494	B. Richer de F.
15	1030/36	6/3	20°37'1S/166°58'E	545 à 317	A. Guille
16	1031/37	7/3	20°37'8S/187°2'7E	825 à 365	M. Roux
Thio SB1					
17	1032/38	8/3	21°25'S/166°24'E	2049 à 1753	C. Gaillard
S. to SW of the Isle of Pinee					
18	1033/39	9/3	22°46'S/167°20'E	290 à 50	P. Bouchet
19	1034/40	10/3	22°46'S/167°20'E	416 à 404	M. Segonzac
20	1035/41	10/3	22°52'7S/167°23'E	616 à 555	A. Guille
21	1036/42	12/3	22°45'S/167°O9'E	344 à 330	B. Richer de F.
22	1037/43	13/3	22°53'S/167°23'E	627 à 563	M. Roux

TABLE 1. — *Cyana* dives during the CALSUB cruise.

TABLEAU 1. — Ptongées de *Cyana* lors de ta campagne CALSUB.

Source : MNHN, Paris

2. - Documentation available for consultation

The video and photographic documents, along with the reports of the dives can be consulted at the Earth Sciences Laboratory at the University of Reims. The biological specimens have been listed and sent out to specialists by the CENTOB (IFREMER - Brest). The samples of sediment or rock have been listed and sent out for study by the Centre for Earth Sciences at the University of Lyon. Copies of slides and a video of the cruise (produced by FR3 Champagne-Ardenne and available only for strictly scientific or pedagogic purposes) are available by request to the head of the mission.

The data chamber which appears on the slides (fig. 4) and video films, indicates the depth, bearing, time and numerical order of the photograph (or, on the videos, the number of the dive). For the lesser depths, the bathymetric readings tend to be overestimated and must be corrected by reckoning that from 500 m up to the surface, the overestimation of the depth varies progressively from 0 to 30 m.

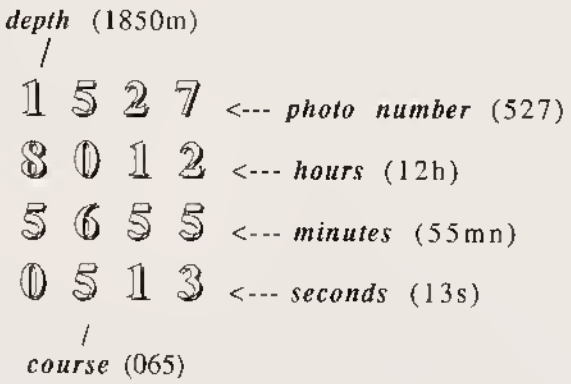


FIG. 4. — Data chamber printed on the lower left side of pictures taken by *Cyana* during CALSUB cruise.

FIG. 4. — Chambre de données apparaissant en bas et à gauche sur les photographies prises par *Cyana* lors de la campagne CALSUB.

The reports of the dives include :

- detailed maps of the route taken and its position in the study zone (for example, figs 5, 6 and 7);
- diagrams indicating the main substrates and environments observed;
- a list of the useful photographs, with a brief commentary and sometimes preliminary names for organisms;
- a selection of the dive's more striking photographs;
- the list of the samples taken with the corresponding video sequences and photographs;
- a summary of the dive, written following the course of the VHS tape, with a temporal guide from the data chamber; here the observations and interpretations have the advantage of having been written 'on the spur of the moment' by the observer;
- complementary information provided, once on board, by the members of the scientific team, or after the mission by specialists who had examined the documents.

Video and photographic documentation gathered during cruises such as this, is often underused. This is probably partly due to the fact that not enough information is available as to its nature and content, and partly to its mere bulk, which means that a thorough preliminary study is necessary before the required information can be found. We have attempted to facilitate the work of specialists interested by the extremely diverse documentation gathered by the CALSUB mission and hope that it will be frequently consulted.

3. - The different sectors explored

3-1. - Around the island of Lifou

The Loyalty Islands, of which Lifou is one of the three largest, are ancient atolls, raised up by the lithospheric bulge which affects the Pacific Plate, before its subduction at the Vanuatu Trench. There is no platform at the

Source : MNHN, Paris

island's edge, and very rapidly we reach depths in the thousands of meters. The three sectors explored off the coast of Lifou (fig. 5) correspond to (1) a sheltered bay, (2) a rise and (3) the flank of an ancient underwater volcano.

3-1-1. - In Santal Bay

Santal Bay is situated on the western coast of Lifou. A narrow projecting edge supports coral pinnacles. The bed of the bay is deep, around a thousand meters, and is reached by a moderate to steep ramp covered in coral sands. By the headlands which enclose the bay to the north and south, the slope is much steeper, even abrupt in places, and rocky beds are predominant. The morphology of this bay might indicate that it is the scar of a collapse which affected Lifou as it rose.

To the north, near cap Aimé, four dives explored the talus between 1150 m and 130 m. The first two (dives 5 and 6) were carried out in the mouth of the bay, in an area swept by currents, and the following two (dives 7 and 8) on the side of a more sheltered spur.

To the south, near the mouth of the bay at cap Lefèvre, three dives (9 to 11), at between 600 m and 700 m, studied the external flanks, often abrupt, of a small coral group, the Shelter reef (fig. 6).

Coral or algal material, and even blocks of rock loosened by erosion, are in constant movement on these steep epibathyal slopes (Rio *et al.*, 1991).

The benthic fauna only develops beyond areas frequently affected by these sedimentary movements. On the whole, the density of benthic fauna observed in Santal Bay was rather low.

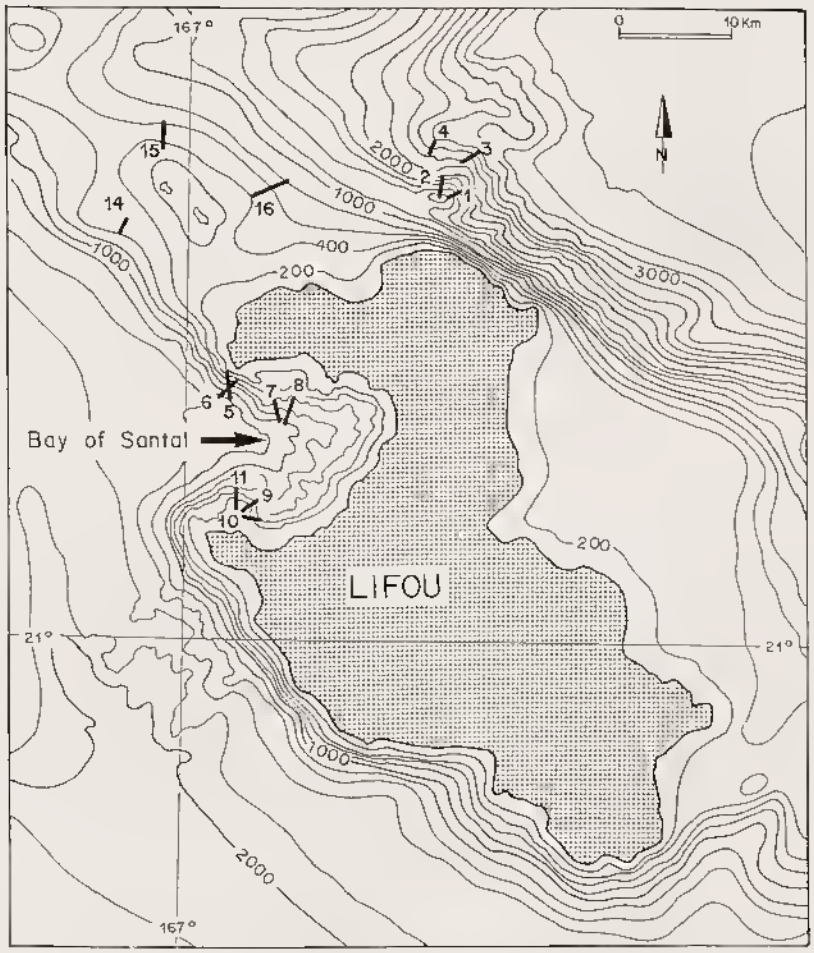


FIG. 5. — Location of dives conducted off Lifou island.

FIG. 5. — Localisation des plongées menées au large de l'île de Lifou.

Source : MNHN, Paris

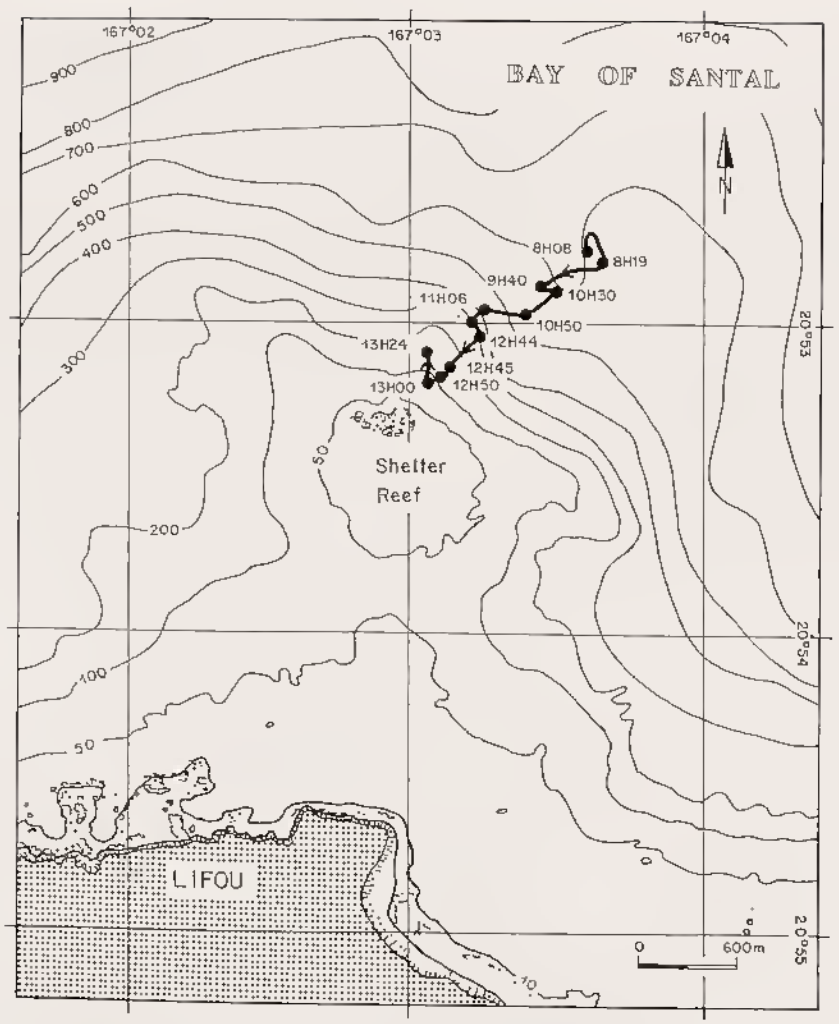


FIG. 6. — Map with the location of dive 9 on the NE flank of Shelter reef. This type of map is available for each dive in Santal Bay.

FIG. 6. — Carte avec la plongée 9 effectuée sur le flanc NE du récif Shelter. Ce type de document existe pour chacune des plongées en baie du Santal.

3-1-2. - On the Ouvéa-Lifou rise

Dives 14, 15 and 16 explored, between 900 m and 400 m, the flanks of the Ouvéa-Lifou rise, just to the west of the Jouan reef, a small coral outcrop. At around 500 m, the first two dives discovered a very peculiar submarine morphology, probably linked to ancient hydrothermal activity (VANNEY, 1991; VANNEY *et al.*, 1992), containing indurated ferromanganiferous rock, dissected by erosion into "mushroom rocks". The other hard ground beds are, for the main part, large calcareous surfaces, often suffering biocorrosion or covered in a thin film of pteropod shells. The flanks of the rise are affected by faults which form the limit of the sedimentary channels swept by currents and which are bordered by subvertical walls (even overhangs in some places). Dive 16, near to Jouan reef, observed substantial quantities of rocks and algal gravel, at times covering the entire bed for around 400 m or 500 m, limiting the benthos to a predominantly vagile fauna. Dive 15, to an area more sheltered from the effects of neritic sediments, observed an abundant fauna attached to the hardened beds.

3-1-3. - In the deeper zone to the North of Lifou

The Sea Beam map SB3 (fig. 7) allowed us to accurately plan four dives (1 to 4), between 1100 m and 2900 m in depth, on the flank of a volcanic seamount with a summit at around 1000 m deep, and slightly detached from

Source : MNHN, Paris

the talus situated to the north of Lifou. Here, rocky slabs or rather coarse volcanic breccia are predominant. In those areas where the slope is less steep and on the few flattish ledges, accumulations of sediment are seen to develop.

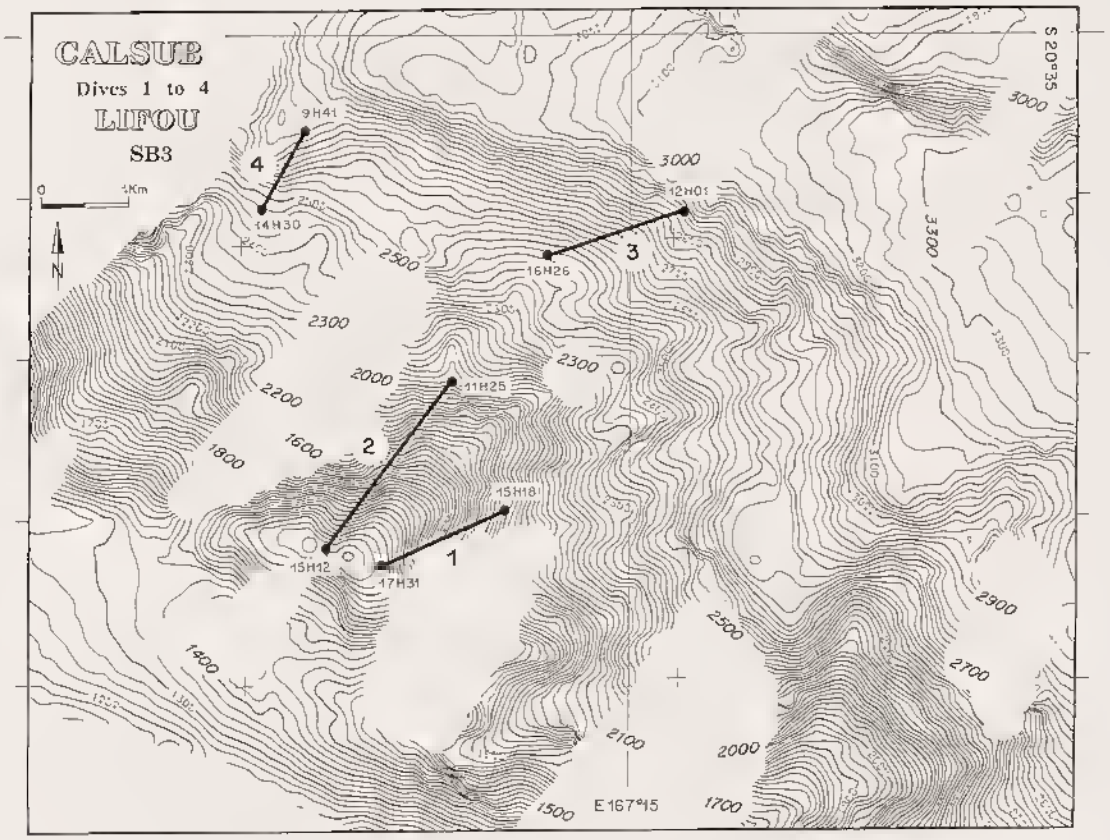


FIG. 7. — Location of dives 1 to 4 off the North of Lifou island. Map without extrapolation, from multibeam sounder of R/V *J. Charcot*.

FIG. 7. — Localisation des plongées 1 à 4 au Nord de Lifou. Carte sans extrapolation, levée avec le Sea-Beam du N/O *J. Charcot*.

These are the dives which best demonstrate the New Caledonian abyssal benthos on hard substratum. Dive 2 (fig. 8) provides us with the clearest picture of the fauna and of its distribution. However, the navigational difficulties we faced with the saucer during dive 3 (the deepest) meant we were unable to localise the route it took, which involved, in part, the sedimentary beds at the foot of the talus.

3-2. - Off the coast of Thio

This is a mesobathyal area, dominated by sedimentary beds in the process of being eroded, and therefore generally much less stable than those in the SB3 area. Weather conditions only allowed us to carry out three dives (12, 13 and 17) on the bathyal talus. It was not possible to explore the fringe of the reef immediately below the barrier reef situated off the coast of Thio. Sea Beam map SB1 (fig. 9) shows a series of trenches and edges parallel to the slope. The dives were performed in stages along the same edge in each case. It would appear that this morphology is dominated by the effects of regressive erosion starting from the base of the talus, since the trenches become less marked towards the top of the talus. This would primarily come about as the result of erosion processes in a sedimentary material that has undergone little or no lithificaton.

We may consider then that the fauna observed is able to adapt to an unstable bed where erosion is active on most surfaces, with a substratum ranging from crumbly to compact, containing slightly more resistant,

Source : MNHN, Paris

ferromanganiferous layers. We only observed more indurated sites on dive 12 near the epibathyal region. Ancient or indeed current bioturbation affects the compact sediments as much as the crumbly sediments; we were able to analyse this in greater detail during dive 17 (GAILLARD, 1991 a and b). The second half of dive 12, which included more indurated substrates, merits a comparison with dives 1 and 2 of SB3.

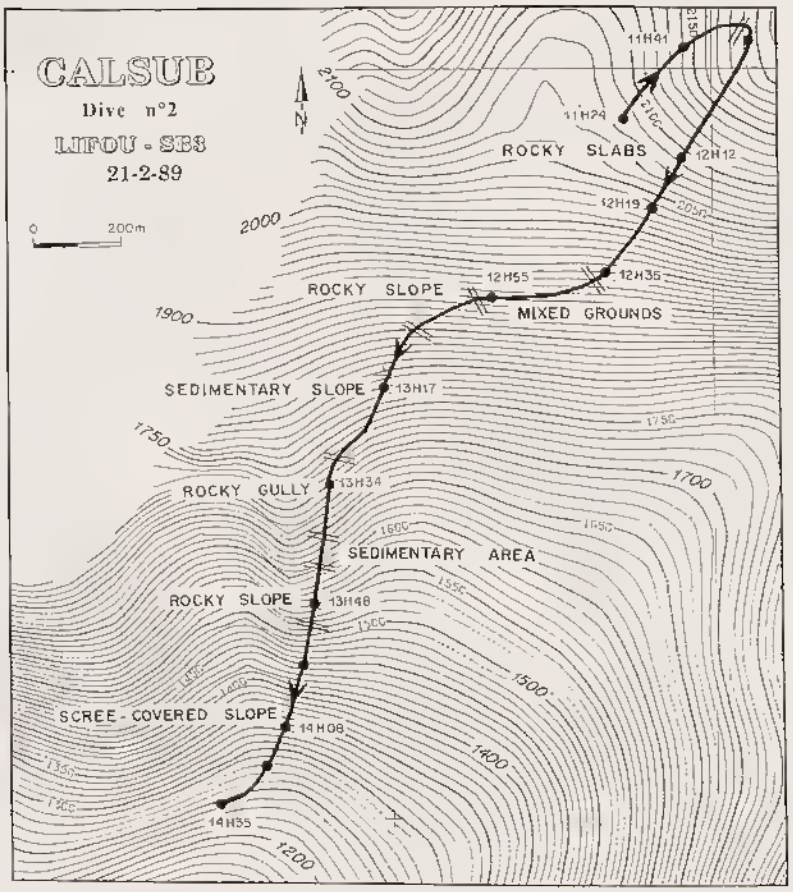


FIG. 8. — Map of the area of dive 2 with the different substrates observed on the north slope of Lifou.

FIG. 8. — Carte de la zone parcourue par la plongée 2 avec les principaux types de fonds observés.

3-3. - Between the Isle of Pines and the Great Southern Reef

Five dives (18 to 22) allowed us to describe the environment of this epibathyal gulley (fig. 10).

Dives 18 and 19 examined the slope which links the outer edge of the coral platform with the Isle of Pines between 60 m and 450 m deep. There is no barrier reef in this place, and the carbonate ooze which accumulates at the edge of the platform leads to mass slides at those areas where the slope becomes steeper.

The ramp which slopes towards the SE and which forms the bottom of the gulley is periodically swept by substantial currents, which create bioclastic hydraulic dunes in areas of sedimentary accumulation, and types of "reg" covered by rocky particles which are a result of the loosening of indurated ferruginous crusts in the non-deposit zones (RIO *et al.*, 1991).

Dive 21, at around 350 m depth, showed some relatively stabilised dunes, separated by rather wide gaps of the "reg" type, rich in well-diversified sessile and vagile benthos.

Dives 20 and 22, between 575 m and 620 m, demonstrated an interesting biosedimentary ensemble, linked to a fault escarpment which channels the currents (figs 11 and 12). Detailed cartography of the area was undertaken using a 3.5 kHz sounder and the bathymetric data collected during the *Cyana* dives. The dunes, in this area, are active with very soft sediment, devoid of sessile epifauna, even in the gaps between dunes. At the foot of the scarp,

Source : MNHN, Paris

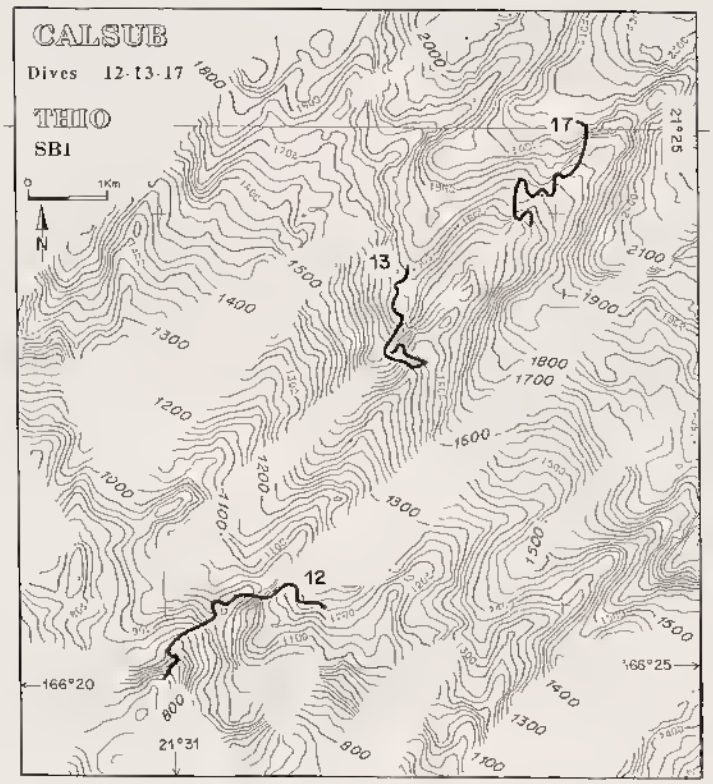


FIG. 9. — Location of dives 12, 13 and 17 on the bathyal slope off the north east of Thio. Map without extrapolation from multibeam sounder of R/V *J. Charcot*.

FIG. 9. — Localisation des plongées 12, 13 et 17 sur le talus bathyal situé au NE de Thio. Carte sans extrapolation, levée avec le Sea-Beam du N/O *J. Charcot*.

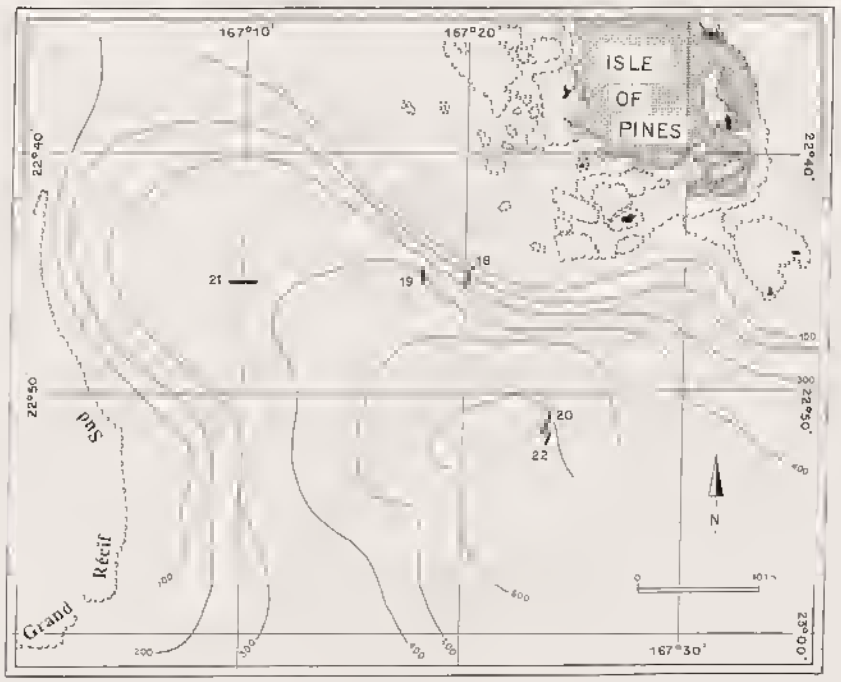


FIG. 10. — Location of dives 18 to 22 on the epibathyal gulley between the Isle of Pines and the Great Southern Reef.

FIG. 10. — Localisation des plongées 18 à 22 dans la gouttière épibathyale entre l'île des Pins et le Grand Récif Sud.

Source : MNHN, Paris

the stronger force of the current excavates a depression several meters deep, covered with blocks of rock, pebbles and very crude bioclastic sediments. The upper end of the subvertical wall is a hardened ferruginous layer, slightly overhanging, which supports a very dense population of suspension-feaders, predominantly Echinoderms (ROUX *et al.*, 1991 a and b).

3-4. - Stylaster Bank

Stylaster Bank is a guyot situated to the southeast of the Isle of Pines, 23°38' S, 167°43' E. Since the high swell prevented us from using the *Cyana* saucer, we carried out instead a series of bathymetric profiles using the 3.5 kHz sounder, in order to gain a precise idea of the morphology and cartography. This guyot is rooted to surrounding beds situated at a depth of around 1000 m (fig. 13). Its flanks are relatively regular and very steep. The summit rises to between 450 m and 500 m depth, and has a very irregular and dissymetric topography. This type of morphology would seem to lend itself well to testing the possible effects of currents on the density of benthic populations and the resulting halieutic resources.

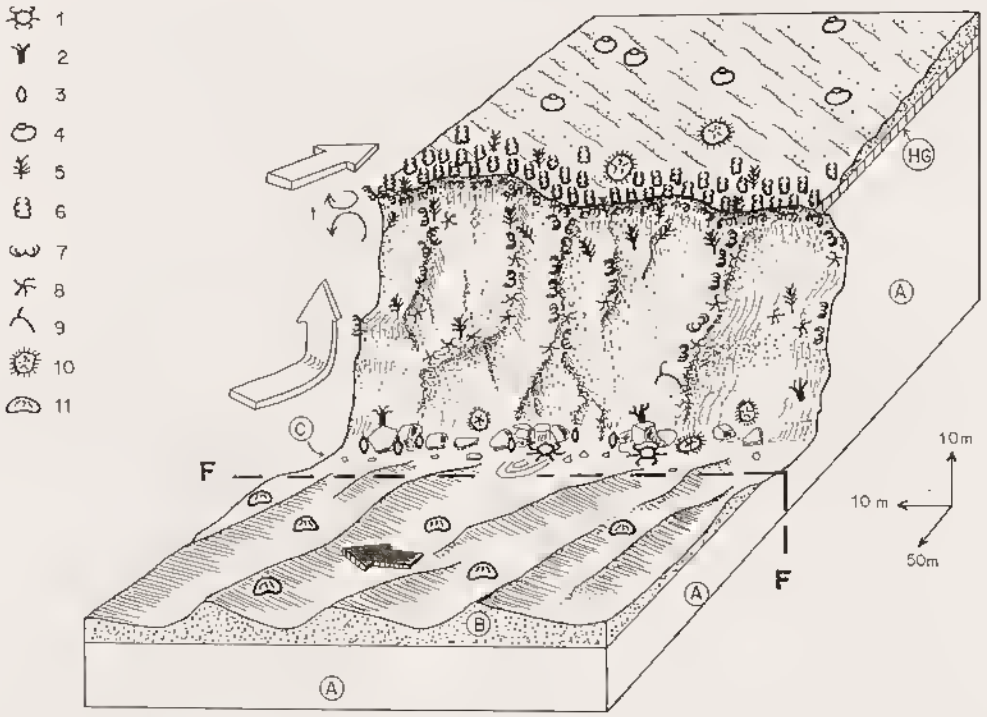


FIG. 11. — The fault escarpment environment observed off the South of the Isle of Pines with its benthic fauna.
A: hemipelagic pliocene chalk; **B** : bioclastic sand; **C** : "reg" at the foot of the fault escarpment; **F** : fault; **HG** : ferruginous hard ground.
1 : crab (*Geryon*); **2** : actinian; **3** : large bivalve (*Acesta*); **4** : spherical siliceous sponge; **5** : zoantharian; **6** : ophiacanthid brittle stars with uplifted arms; **7** : suspension-feeding sea stars (Brisingidae); **8** : ophiacanthid brittle stars with arms crawling on the substrate; **9** : bourgueticrinid stalked crinoid (*Porphyrocrinus*); **10** : regular soft sea urchin (*Phormosoma*); **11** : spatangid sea urchin (*Taimanawa*). Arrows indicate direction of currents.
This site is also illustrated in fig. 22-2 to 4 and fig. 25-6.

FIG. 11. — L'escarpement de faille observé au sud de l'île des Pins et sa faune benthique.
A : craie hémipélagique d'âge pliocène; **B** : sable bioclastique; **C** : "reg" en pied d'escarpement; **F** : faille ; **HG** : surface durcie ferrugineuse.
1 : crabe (*Geryon*); **2** : actinie; **3** : bivalve limidé (*Acesta*); **4** : éponge siliceuse globuleuse; **5** : zoanthaire; **6** : ophiure ophiacanthidée aux bras dressés; **7** : astérie brisingidée; **8** : ophiure ophiacanthidée aux bras plaqués sur le substrat; **9** : crinoïde pédonculé (*Porphyrocrinus*); **10** : échinide régulier (*Phormosoma*); **11**: échinide irrégulier (*Taimanawa*). Les flèches indiquent le sens des courants.
Ce site est également illustré fig. 22-2 à 4 et fig. 25-6.

Source : MNHN, Paris

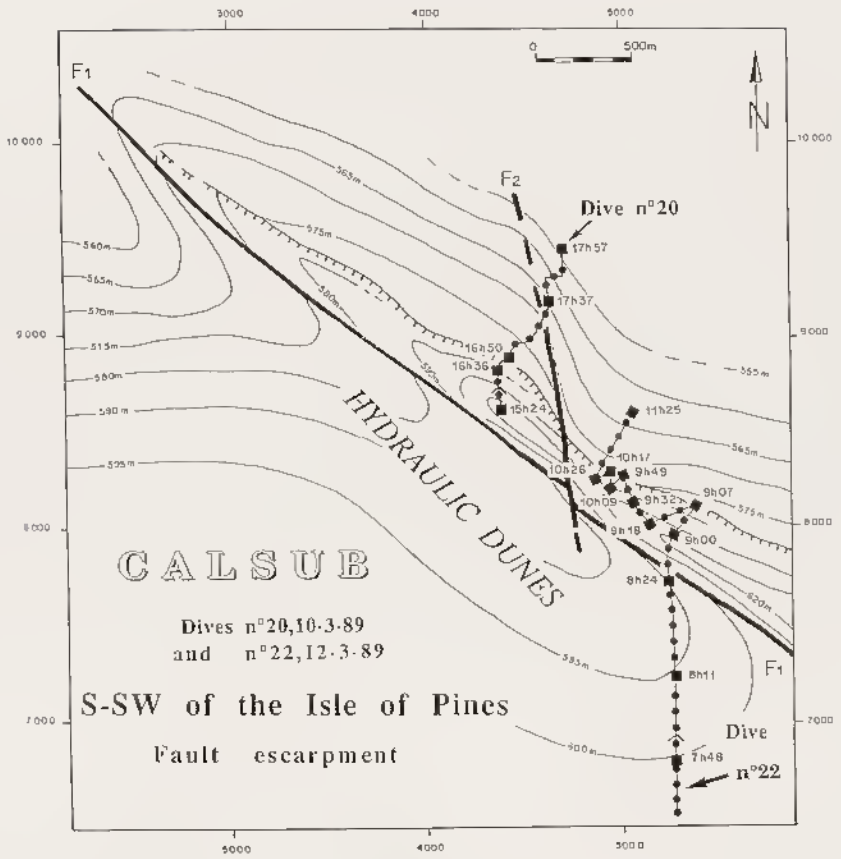


FIG. 12. — Map of the fault escarpment with hydraulic dunes area off the South of the Isle of Pines, and location of dives 20 and 22.

FIG. 12. — Carte du relief de faille et de la zone à dunes hydrauliques situés au sud de l'île des Pins, et localisation des plongées 20 et 22.

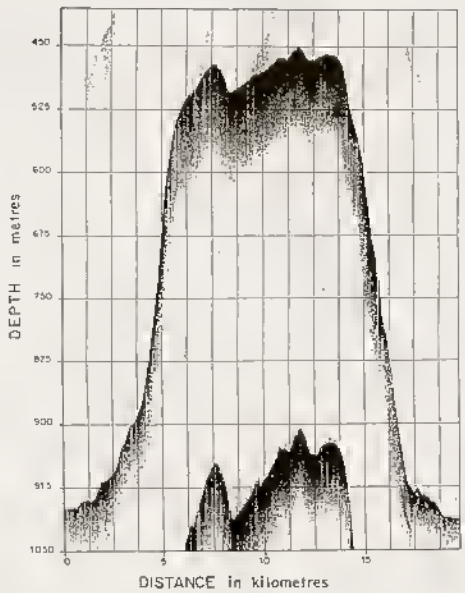


FIG. 13. — Bathymetric profile of the Stylaster Bank (3.5 kHz sounder).

FIG. 13. — Profil bathymétrique du banc Stylaster (sondeur 3,5 kHz).

Source : MNHN, Paris

MAIN OBSERVATIONS AND REMARKS

1. - Remarks on climate and hydrology

During the austral summer, New Caledonia is subject to the influence of equatorial depressions and may at times suffer from tropical cyclones which arise in the Coral Sea and to the north of the arc formed by Vanuatu and the Salomon Islands.

The violent winds and the strong rainfall which go hand in hand with tropical depressions and cyclones are particularly strongly felt by the marine environment, causing strong swells, drop in salinity, serious perturbations of the currents, homogenisation of the shallow sea water layer, exceptionally high tidal ranges, and resuspension of sediments from the bed, with a consequent strong increase in the turbidity of the sea water. They probably also have consequences, for the environment at a much deeper level, as we shall see later. Depressions such as these, which result in fierce storms, pass close to Grande Terre on average once or twice a year (ROUGERIE, 1986).

New Caledonia is set within the hydrological context of the Coral Sea, which is very open to the great oceanic currents running through the central and southwestern Pacific. The hydrology in the basin of the Loyalty Islands during the winter of 1981 was analysed by D. GUEVEL (1983). In addition, the *Cyana* diving saucer recorded temperature contours at the time of the CALSUB dives at the end of the summer of 1989 (fig. 14).

The vertical thermohaline structure in winter (fig. 14C) shows a salinity maximum of 35.68 ‰ between 150 and 170 m, thereby separating the southern layer of subtropical water from the superficial layer of water

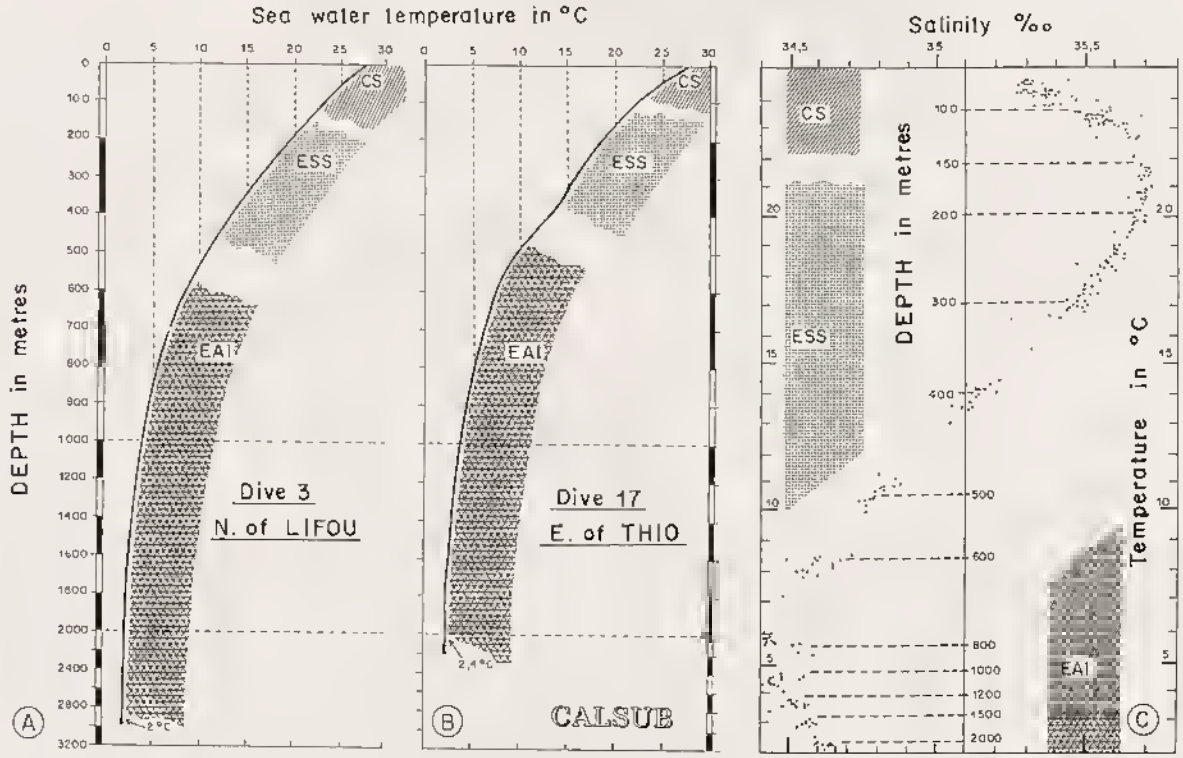


FIG. 14. — Vertical hydrological profiles near the east edge of Loyalty ridge (A) and basin (B and C).
A and B : data recorded by the diving saucer *Cyana* during CALSUB cruise ; C : modified from GUEVEL, 1983.
CS : shallow water layer; ESS : southern subtropical water layer; EAI : intermediate deep antarctic water layer.

FIG. 14. — Profils hydrologiques au large de la Nouvelle-Calédonie. Structure thermique et thermohaline verticale à l'est de la ride (A) et dans le bassin des Loyauté (B et C).
A et B : données enregistrées par la soucoupe *Cyana* lors de la campagne CALSUB; C : modifié d'après GUEVEL, 1983.
CS : couche superficielle; ESS : eau subtropicale sud; EAI : eau antarctique intermédiaire.

Source : MNHN, Paris

which is saltier to the South (subtropical influence) than to the North (equatorial influence). The intermediate antarctic water, which is travelling north, has an average 34.50% salinity and a 5°C temperature in this area. Minimal salinity values occur between 700 m and 1100 m. Its upper limit has been defined at nearer 600 m close to the barrier reef off the coast at Nouméa (ROUGERIE, 1986). This conclusion is also suggested by the CALSUB thermal readings (fig. 14 A and B) and it may even rise further towards the end of summer off the coast of Thio, which would explain the rapid fall in temperature between 400 m and 500 m.

The cartography of the water masses in the Loyalty basin (GUEVEL, 1983) demonstrates the following : (1) a superficial frontal zone to the west of Maré which separates warmer and less salty water in the north from that in the south; (2) between 0 to a depth of 200 m, a geostrophic current running towards the SE, which dominates the NW drift resulting from the trade winds; (3) at a depth of 1000 m, a geostrophic current running towards the NW.

Seasonal changes in the principal surface currents are more noticeable on the western edge of Grande Terre, as well as to the S and SE of the Isle of Pines. The strength of the currents observed between 300 m and 650 m by the CALSUB dives between the Isle of Pines and the Great Southern Reef may be due to seasonal conditions which could cause to the upper part of the antarctic water layer to rise, channelled by the morphology of the gulley. It may also be due to the effect of internal waves being propagated along the upper limit of the antarctic water layer. The moving hydraulic dunes observed during dive number 22, as well as the presence of Echinoderms which we would normally expect to encounter much deeper (see later) all indicate the frequent, if not almost permanent influence of antarctic water at a depth of around 600 m. The more stabilised dunes observed at around 350 m during dive 21, are probably due to a more exceptional activity of deep currents likely to give rise to them (fig. 15).

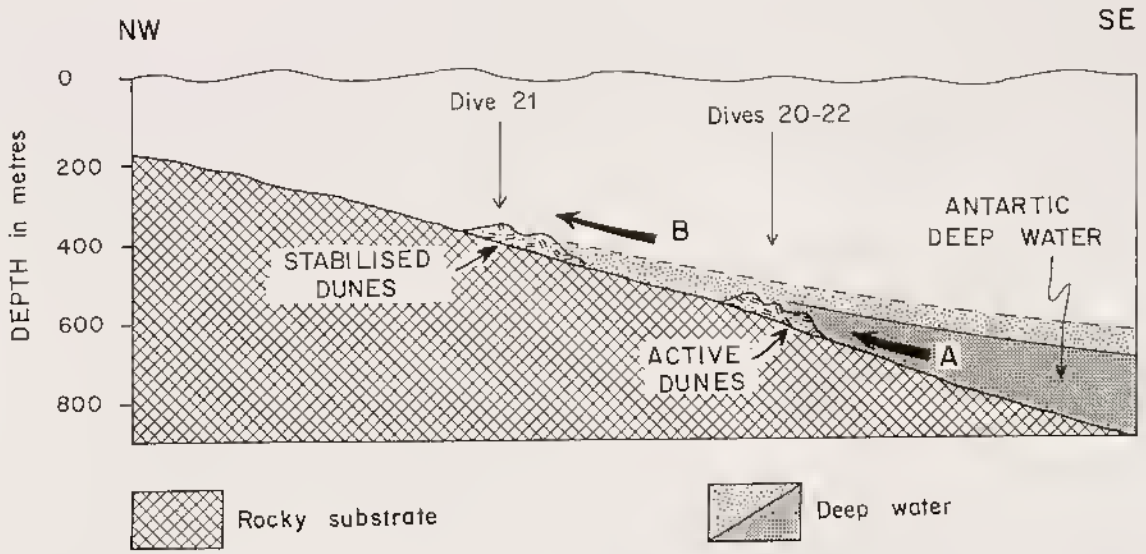


FIG. 15. — Axial profile of the epibathyal gulley between the Isle of Pines and the Great Southern Reef.
A : frequent upwellings of antarctic water explaining active hydraulic dunes. B : exceptional upwellings of antarctic water allowing the formation of stabilised hydraulic dunes and development of a diversified benthic fauna.

FIG. 15. — Profil axial de la gouttière épibathyale située entre l'île des Pins et le Grand Récif Sud.
A : remontées fréquentes de l'eau antarctique intermédiaire entretenant des dunes hydrauliques vives. B : remontées exceptionnelles permettant la stabilisation des dunes hydrauliques et la colonisation par une faune benthique diversifiée.

2. - Bathymetric distribution of communities

Because these results have already been presented and discussed in some detail elsewhere (ROUX *et al.*, 1991 a and b), we shall restrict ourselves to a summary of the main aspects here. In the bathyal domain of New Caledonia, it appears that the changes in fauna, as we head deeper down into the ocean, are closely linked to the limits of the different water layers.

Source : MNHN, Paris

It is at depths of around 100 m to 150 m that the break in the slope limiting the platform usually occurs, and that the fall in luminosity is most noticeable. In Santal Bay, encrusting green algae, of the *Palmophyllum*-type, are associated with rhodolites at around 110 m, whereas *Melobesia*-type algae are found as deep as 145 m. Compact algal structures, supporting a rich fauna of large gorgonians, sponges and antipatharians (figs 21-1 and 21-2), develop between 60 m and 100 m. Algal slabs with scoriaceous surfaces tend to lose their blanket of sessile megafauna, particularly when the incline becomes steeper, at around 80 m to 100 m (fig. 21-3). Beyond 100 m, algal balls dominate, together with a primarily vagile epifauna (fig. 21-4). The substratum's biological cover becomes more dispersed and its bathyal character becomes evident from 150 m downwards, when the layer of southern subtropical water is entered.

The epibathyal domain (from approximately 150 m to 700 m) is characterized by a wide variety of beds. Rocky slabs, covering soft sediment, undermined by the burrowing of crustaceans or fish, conserve caverns sheltering a number of sessile and vagile organisms (figs 22-1 and 23-4). The hard beds alternate with sedimentary beds of varying stability and granulometry (ranging from masses of fallen rock to hemipelagic ooze). They are frequently covered by vegetal debris, at times of some considerable size. This debris becomes rarer as we go deeper; however, we did observe a tree, probably uprooted during a cyclone, at a depth of about 2000 m (fig. 23-6).

On the upper part of the talus, the rocky surfaces are often swept by avalanches of sediment, which is at times quite crude, coming from the outer edge of the platform (fig. 23-2). On these unstable substrates, only a vagile or semi-vagile fauna develops (holothurians, sea stars, comatulid crinoids, gasteropds). Those surfaces better sheltered from these movements of sediment (figs 21-5 and 23-5) show a great diversity of siliceous sponges, some of which (fistulous sponges, clionids) seem to participate in the cupulate erosion of the substratum (GAILLARD, 1991 a).

Between 300 m and 700 m, large steep indurated surfaces support different communities of suspension-feeders (gorgonians, echinoderms, sponges) (fig. 22-5). On the Ouvéa-Lifou rise, each community is clearly dominated by one or two species, and it is possible to observe groups consisting of a single species, particularly the echinoderms (fig. 23-3). In the area to the SW of the Isle of Pines, the richness and abundance of the macrofauna reaches high levels. Between 320 m and 410 m, in the zone of the relatively stabilised dunes (fig. 22-6), the epifauna is extremely diverse (brachiopods, gasteropods, *Stylaster* corals, sponges including lithistids, echinids, stalked crinoids, crustaceans), with a regular and fairly homogeneous spread. At around 600 m, the fault scarp, at the foot of which moving hydraulic dunes develop (fig. 25-6) demonstrates, in a relatively reduced space, how the intensity of the currents and the nature of the substrate can affect the composition of benthic communities (fig. 11). The summit of the scarp supports very dense communities of suspension-feeders, dominated by echinoderms (fig. 22-2 to 4). A large part of this fauna, particularly among the echinoderms (*Phormosoma* and brissinginds, for example), is in great abundance, and normally more characteristic of depths below 1000 m. In fact, this site marks the beginning of the transition zone between the beds washed by subtropical water and those washed by intermediate antarctic water.

This transition generally occurs between 700 m and 1000 m. The communities in this zone, which are often rather peculiar, may still be quite dense. What singles them out is the presence of hexactinellid sponges, notably the abundance of *Monorhaphis* (figs 24-1 and 24-2). These communities already contain taxa which, as we shall see, dominate the deepest areas explored (e. g. hyocrinid crinoids, *Euplectella*, *Hyalonema*, *Iridogorgia* -fig. 16A-, xenophiophorids, etc.).

Beyond 1000 m, the macro- and megafauna become definitely more scarce, while remaining quite diversified. Individual specimens are apt to grow very large, in some cases over one metre. The stalked hexactinellid sponges become very diversified (fig. 24-6). The sponges and dead branches of gorgonians frequently support suspension-feeders (comatulid crinoids, sea stars, brittle stars, actinians), at times in thick bunches (fig. 24-3). Between 1000 m and 1600 m, the megafauna on the rocky surfaces is characterised by the simultaneous presence of three forms : two homeomorphic stalked crinoids (*Proisocrinus* and *Guillecrinus*) (figs 24-4 and 24-5) and a gorgonian of the genus *Metallogorgia* (fig. 16B). At around 2000 m, we see the first examples of large *Euplectella*, attached to the gently sloping rocky beds. In the sedimentary zones, the relative importance of bioturbation increases with depth (fig. 26-1), and different ichnofacies are the distinguishing markers for lower or upper beds at a depth of around 1800 m (GAILLARD, 1991).

Source : MNHN, Paris

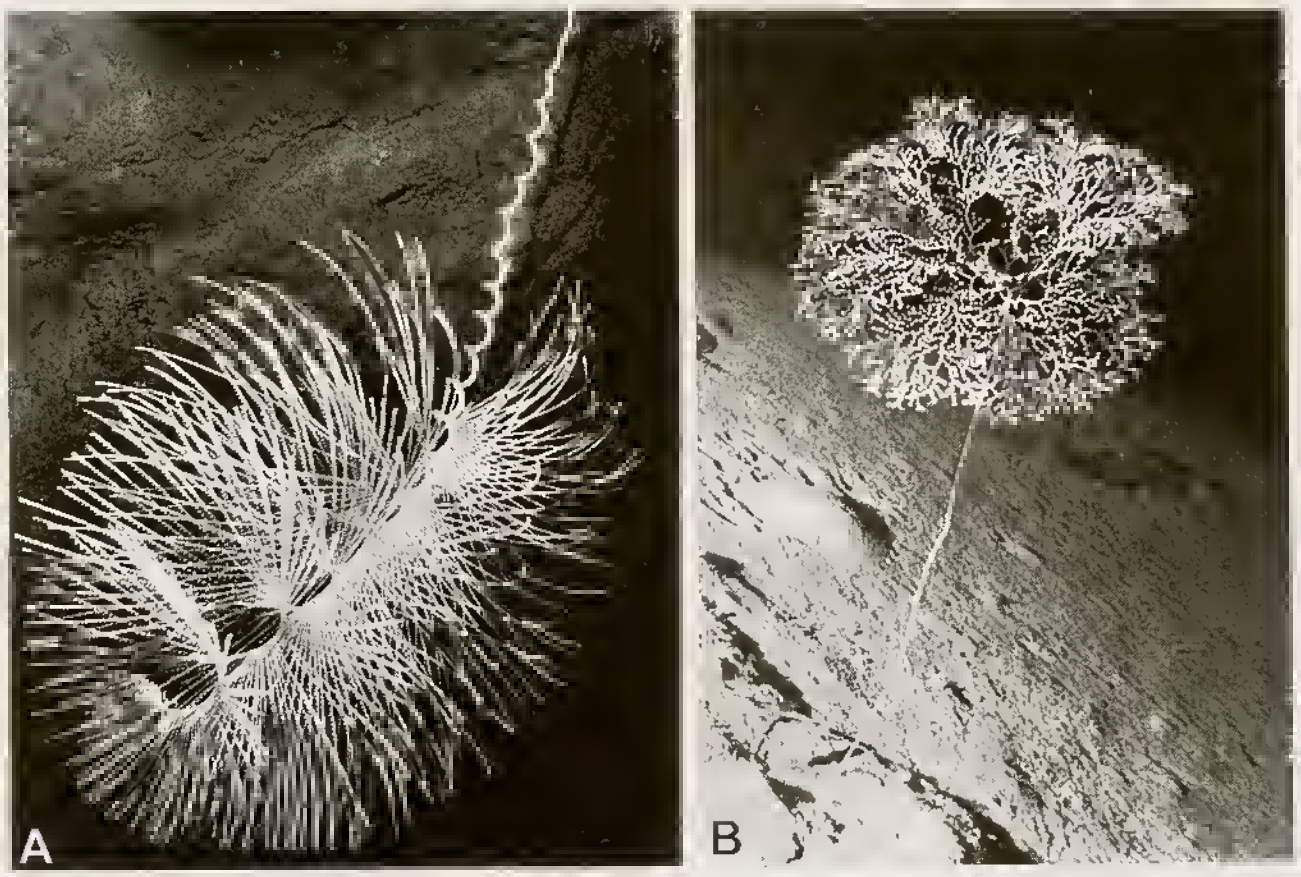


FIG. 16. — Two bathyal gorgonians with a typical morphology.
A : a large specimen of the genus *Iridogorgia* on the slope off Thio (dive 12, depth 880 m, observer H. ZIBROWIUS); B : a specimen of the genus *Metallogorgia* on the mesobathyal slope off Thio (dive 13, depth 1766 m, observer M. SEGONZAC).

FIG. 16. — Deux gorgones bathyales avec une morphologie typique.
A : un grand individu du genre *Iridogorgia* sur le talus au large de Thio (plongée 12, profondeur 880 m, observateur H. ZIBROWIUS); B : un individu du genre *Metallogorgia* sur le talus mésobathyal au large de Thio (plongée 13, profondeur 1766 m, observateur M. SEGONZAC).

3. - Notes on a few particular taxa

3-1. - Behaviour of the cephalopods

Solitary specimens of the New Caledonian nautilus (*Nautilus macromphalus*) were encountered several times between 300 m and 545 m during dives carried out during the day around the Loyaly Islands. A piece of bait (chicken), placed on the sea bed 10 to 12 hours prior to dives 19 (413 m) and 22 (610 m), to the SW of the Isle of Pines, attracted a group of around fifteen nautilus specimens during dive 19 (fig. 23-1); only crustaceans (*Geryon* and *Heterocarpus*) came to the bait for dive 22. Our observations of the bathymetric distribution of the nautili confirm the data acquired through use of lobster pots between 1976 and 1978 (INTÈS, 1978; RANCUREL, 1990).

The specimens encountered by the *Cyana* saucer were very active and swam efficiently, without crashing against the rocky walls. Their speed can reach between 20 and 30 cm/s (ROUX, 1990), which indicates that their physiological optimum would seem to be superior in an epibathyal environment, rather than under experimental conditions on the surface, where their ability to oxygenate does not seem to allow them to exceed a speed of 16 cm/s (WELLS & WELLS, 1985; WELLS, 1987 and *in litt.*).

Two very different types of behaviour were noted in the cirrates (Cirroctopoda). The most spectacular recorded and photographed sequences were those of dives 3 (*Cirrothauma*) and 16 (*Opisthoteuthis*).

Source : MNHN, Paris

At a depth of 2880 m, a specimen (which may belong to the genus *Cirrothauma*), when touched by the claw of the *Cyana*, quickly inflated his interbrachial membrane into a turgescent balloon, reminiscent of a pumpkin (figs 17A and 17B) (BOLETZKY *et al.*, 1992). This may be a means of capturing prey which, once spotted, would be engulfed in the brachial ensemble. However, in an environment where light does not penetrate, tactile stimuli are likely to be important and the ballooning response might have a stunning or disorientating effect on a potential predator in a first (possibly accidental) contact with the cirrate. This could thus be a defense mechanism.

At a depth of 812 m, a specimen of the genus *Opisthoteuthis* demonstrated that it was able to pass unnoticed on a sloping rocky substratum by retracting itself into the form of an hemisphere (figs 17C and 17D). These two octopods are capable of "gliding" by stretching out their arms and interbrachial membranes, thereby moving like a parachute between two active phases of swimming.

3-2. - Behaviour of some of the fish encountered

B. SÉRET gives a list (table 2) and pictures (figs 18 and 19) of the main species of fish observed during the course of the CALSUB cruise and of which we have photographs or video sequences taken aboard the *Cyana* saucer. Here he also gives additional observations and remarks on the behaviour of a few kinds of fish we observed.

Numerous pictures of fish were taken during the *Cyana* dives, but only about sixty could be identified to species, genus or family from the morphological characters observed. The identifications of taxa are listed in table 2, with doubts remaining for a few attributions because of the difficulties of basing determinations on photographs only. However, two specimens were photographed and collected by A. GUILLE during dive 20 : one specimen (362 mm LT) of the macrourid rat-tail fish *Coelorhinchus anatirostris* (photo 023, collection MNHN 1989-965) and one specimen (613 mm LS) of the trichiurid silver scabbardfish *Lepidotus caudatus* (photo 061, collection MNHN 1989-966).

We have selected the following remarks on the behaviour of a number of species observed from *Cyana*.

Numerous sharks, mainly the shortnose spurdog *Squalus megalops* (fig. 18D) and the kitefin shark *Dalatias licha* (fig. 18E) were observed. These observations are corroborated by the shark specimens frequently collected during recent investigations on several seamounts off New Caledonia. Photograph 385 of dive 19 is a good illustration of the opportunistic scavanging behaviour of the kitefin shark *Dalatias licha* : attracted by a bait, they wait for the *Nautilus* to finish feeding (fig. 23-1) without attacking any of them. Another observation of interest is that of the behaviour of *Squalus megalops* : this demersal shark was resting on the sea floor, evidence that its respiration is not dependent on permanent movement as had frequently been assumed. Specimens of a new species of cat shark belonging to the genus *Galeus* or the genus *Halaelurus* were observed, two genera never before recorded in New Caledonian waters. During dive 22 at a depth of 613 m, a specimen of the skate genus *Notoraja* was photographed (photo 093) resting on the flank of a bioclastic sandy dune; this is probably a new species, a few juvenile specimens of which were collected during BIOGEOCAL cruise.

FIG. 17. — Behaviour of two cirrate octopods.

A : just before contact with *Cyana*'s claw, a specimen having affinities with the genus *Cirrothauma* gliding through the water, arms outstretched and showing the well-developed interbrachial membrane. **B** : the same specimen reacting to contact with the claw by inflating its interbrachial membrane into a turgescent balloon (dive 3, depth 2880 m, observer M. RIO).

C : a specimen of the genus *Opisthotheutis* swimming. **D**: the same specimen several minutes after the previous shot, rolled into a ball on the rocky substrate (Dive 16, depth 813 m, observer M. ROUX).

FIG. 17. — Comportement de deux octopodes (Cirrates).

A : juste avant le contact avec la pince de *Cyana*, un individu proche du genre *Cirrothauma* "planant" entre deux eaux, les bras étendus et montrant la membrane interbrachiale bien developpée. **B** : le même individu réagissant au contact de la pince en gonflant sa membrane interbrachiale en un ballon turgescent (plongée 3, profondeur 2880 m, observateur M. RIO).

C : un individu du genre *Opisthotheutis* nageant. **D**: le même individu, quelques minutes après la vue précédente, posé sur le substrat rocheux et rétracté en boule sur lui-même.(Plongée 16, profondeur 813 m, observateur M. ROUX).

Source : MNHN, Paris

Source : MNHN, Paris

Taxa	Slide ref.	Depth	No.
CHONDRICHTHYANS			
Squalidae			
Centrophorus sp.	S16-036	818 m	1 ex.
Dalatias licha (Bonnaterre, 1798)	S19-233	415 m	1 ex.
	S19-270	416 m	1 ex.
	S19-331	409 m	1 ex.
	S19-369	561 m	1 ex.
	S19-385	413 m	1 ex.
	S20-102	609 m	1 ex.
	S20-105	609 m	1 ex.
	S20-370	561 m	1 ex.
Squalus megalops (Macleay, 1881)	S19-114	412 m	1 ex.
	S21-126	342 m	1 ex.
	S21-372	337 m	1 ex.
	S21-450	332 m	1 ex.
	S21-454	332 m	1 ex.
Squalus cf. *melanurus* Fourmanoir, 1978	S11-081	493 m	1 ex.
Scyliorhinidae			
Galeus sp. or *Halaelurus* sp.	S12-507	796 m	1 ex.
	S16-178	821 m	1 ex.
Rajidae			
Notoraja sp.	522-093	613 m	1 ex.
TELEOSTEANS			
Synaphobranchidae			
?*Synaphobranchus* sp.	S07-009	973 m	1 ex.
Congridae			
?*Conger* cf. *cinereus* (Rüppel, 1828)	S17-130	2033 m	1 ex.
Unidentiifed congrid	S07-149	945 m	1 ex.
Halosauridae	S06-302	874 m	1 ex.
Chlorophthalmidae			
Bathypterois ef. *guentheri* Alcock, 1889	S16-207	823 m	1 ex.
	S02-155 à 163	2015 m	1 ex.
Chlorophthalmus sp.	S05-06	959 m	1 ex.
Neoscopelidae			
Neoscopelus cf. *macrolepidotus* (Johnson, 1863)	S08-134	840 m	1 ex.
Moridae	S03-119	2809 m	1 ex.
Macrouridae			
Coelorhinchus anatirostris Jordan & Gilbert, 1904	S20-023	616 m	1 ex.
Coelorhinchus cf. *anatirostris*	S12-339	1020 m	1 ex.
	S12-340	1020 m	1 ex.
?*Ventrifossa* sp.	S06-314	831 m	1 ex.
	S07-152	934 m	1 ex.
	S11-038	616 m	1 ex.

Source : MNHN, Paris

Trachichthyidae			
Hoplostethus cf. *mediterraneus* Cuvier, 1829	S15-377	373 m	1 ex.
Lophiidae	S22-023	601 m	1 ex.
Ateleopodidae			
?*Ateleopus* sp.	S08-194	678 m	1 ex.
Serranidae			
Epinephelus morrhua (Valenciennes, 1833)	S18-408	142 m	1 ex.
Epinephelus octofasciatus Griffin, 1926	S15-454	356 m	2 ex.
	S15-460	356 m	2 ex.
Apogonidae			
Apogon sp.	S14-612	495 m	1 ex.
Carangidae			
?*Pseudocaranx dentex* (Bloch & Schneider, 1801)	S18-535	71 m	8 ex.
Lutjanidae			
Etelis carbunculus (Cuvier, 1828)	S16-664	359 m	1 ex.
Etelis coruscans Valenciennes, 1862	S15-358 à 360	379 m	1 ex.
	S16-576	512 m	1 ex.
	S16-577	512 m	1 ex.
	S16-586	512 m	1 ex.
Pristipomoides argyrogrammicus (Val., 1831)	S05-267	295 m	1 ex.
Gempylidae			
Rexea prometheoides (Bleeker, 1856)	S06-050	1137 m	1 ex.
Trichiuridae			
Lepidotus caudatus (Euphrasen, 1788)	S20-061	616 m	1 ex.
Tetraodontidae			
?*Lagocephalus* sp.	S18-214	276 m	1 ex.

TABLE 2. — Identification of fishes from photographs taken by *Cyana* during the CALSUB cruise (listed by B. SÉRET).

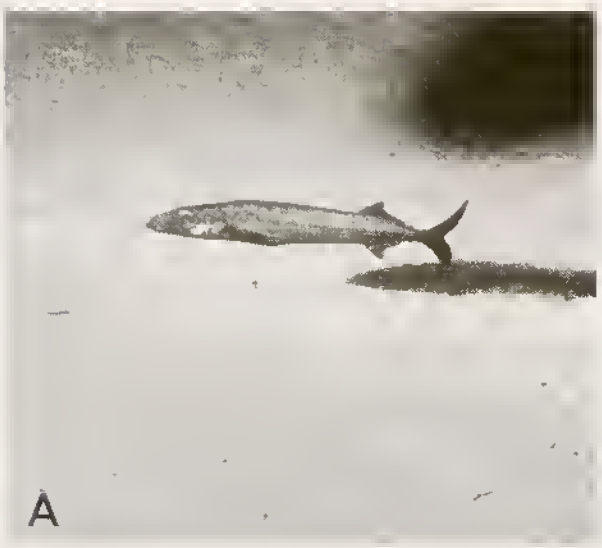
TABLEAU 2. — Liste des poissons identifiables photographiés par *Cyana* lors de la campagne CALSUB (déterminations par B. SÉRET).

Among the teleostean fishes, several individuals of about three species were observed. The first example in New Caledonia of *Coelorhinchus anatirostris* was photographed and collected during the CALSUB cruise, a species which was only previously known from Japanese waters and the China Sea.

FIG. 18. — A few fishes observed during the CALSUB cruise.
A : oilfish belonging to the genus *Rexea* (dive 06; depth 1137 m; observer B. LAURIN). **B** : conger eel attributable to *Conger* cf. *cinereus* (dive 17; depth 2033 m; observer C. GAILLARD). **C** : ruby snapper of the species *Etelis coruscans*, circling the saucer before coming to rest on the sea bed within range of the spotlights (dive 16; depth 512 m; observer M. ROUX). **D** : spurdog of the species *Squalus megalops*, resting on the sea bed (dive 21; depth 332 m; observer B. RICHER DE FORGES). **E** : kitefin shark, *Dalatias licha*, lurking around the manipulating arm of the saucer (dive 19; depth 415 m; observer M. SEGONZAC).

FIG. 18. — Quelques poissons observés durant la campagne CALSUB.
A : individu attribué au genre *Rexea* (plongée 6, profondeur 1137 m, observateur B. LAURIN). **B** : congre attribuable à *Conger* cf. *cinereus* (plongée 17, profondeur 2033 m, observateur C. GAILLARD). **C** : vivaneau de l'espèce *Etelis coruscans*, tournant autour de la soucoupe avant de s'immobiliser, posé sur le fond dans le champ des projecteurs (plongée 16, profondeur 512 m, observateur M. ROUX). **D** : requin de l'espèce *Squalus megalops* se reposant sur le fond (plongée 21, profondeur 332 m, observateur B. RICHER DE FORGES). **E** : requin de l'espèce *Dalatias licha*, rodant autour du bras manipulateur de la soucoupe (plongée 19, profondeur 415 m, observateur M. SEGONZAC).

Source : MNHN, Paris


A

B

C

D

E

Source : MNHN, Paris

The two wonderful species of ruby snapper observed exhibit very different behaviour on the approach of the saucer. We were only able to take photographs of *Etelis carbunculus* on exceptional occasions because it swam off rapidly every time the saucer came close. By contrast, *Etelis coruscans* moves more slowly and willingly circles around the saucer. During dive 16 at a depth of 512 m, one individual came to rest just in front of *Cyana* and remained motionless, as if immobilised by the spotlights (fig. 18C).

During dive 23 at a depth of 2015 m, a beautiful example (fig. 19) of the tripodfish *Bathypterois* cf. *guentheri*, a species typical of the abyss, was filmed swimming and coming to rest in its classic position, perched on its long pectoral fins and caudal fin, like a tripod, lying in wait for its prey.

FIG. 19. — An abyssal tripodfish attributable to *Bathypterois* cf. *guentheri* about to come to rest on a sedimentary bed (dive 02; depth 2015 m; observer M. ROUX).

FIG. 19. — Un poisson abyssal "tripode" attribuable à *Bathypterois* cf. *guentheri* prêt à se poser sur un fond sédimentaire (plongée 2, profondeur 2015 m, observateur M. ROUX).

Numerous fish, of all sizes, burrow in the sediment and are therefore agents of bioturbation. Some, generally of small to medium size, were seen to dig head-first into the sand, or to work the sand along a stretch of several decimetres (fig. 25-5); it is clear that they feed on the superficial endofauna in this way. Others, often slightly larger (groupers, ruby snappers) shelter in niches dug by the movement of soft sediment under an indurated level. This burrowing can lead to the creation of cavernous substrates which are home to a rich, vagile fauna (VANNEY, 1991).

3-3. - The importance of bioturbation and biocorrosion

An inventory of the principal biogenic tracks has been drawn up (fig. 25 and 26) (GAILLARD, 1991 a and b). It is at depths of between 1800 m and 2000 m that bioturbation seems to be at its most diversified (fig. 20). The most original discoveries were the observation of the ichnogeni *Paleodictyon* and *Urohelminthoida*, exceptional in this area, and that of a new track ("track FC"), which was very common and characteristic of the bathymetric level between 1600 m and 2000 m (fig. 26-6 and 26-8). The bioturbation of the soft sediment is variable since it depends to a large extent on the rhythm and the degree of external elements, particularly turbiditic faecal elements. Biocorrosion of the rocky substrata is substantial towards the top of the slopes, but is more difficult to evaluate in the semi-indurated oozes of the talus, since the numerous cavities witnessed here may be of recent origin (biocorrosion) or former burrows in the process of being eroded (bioturbation). Fish and crustaceans sweep soft sediment away from under indurated surfaces, thereby contributing to the formation of cryptic ecological niches. Whatever the answer, it is certain that the action of organisms plays a role in the general process of erosion.

Source : MNHN, Paris

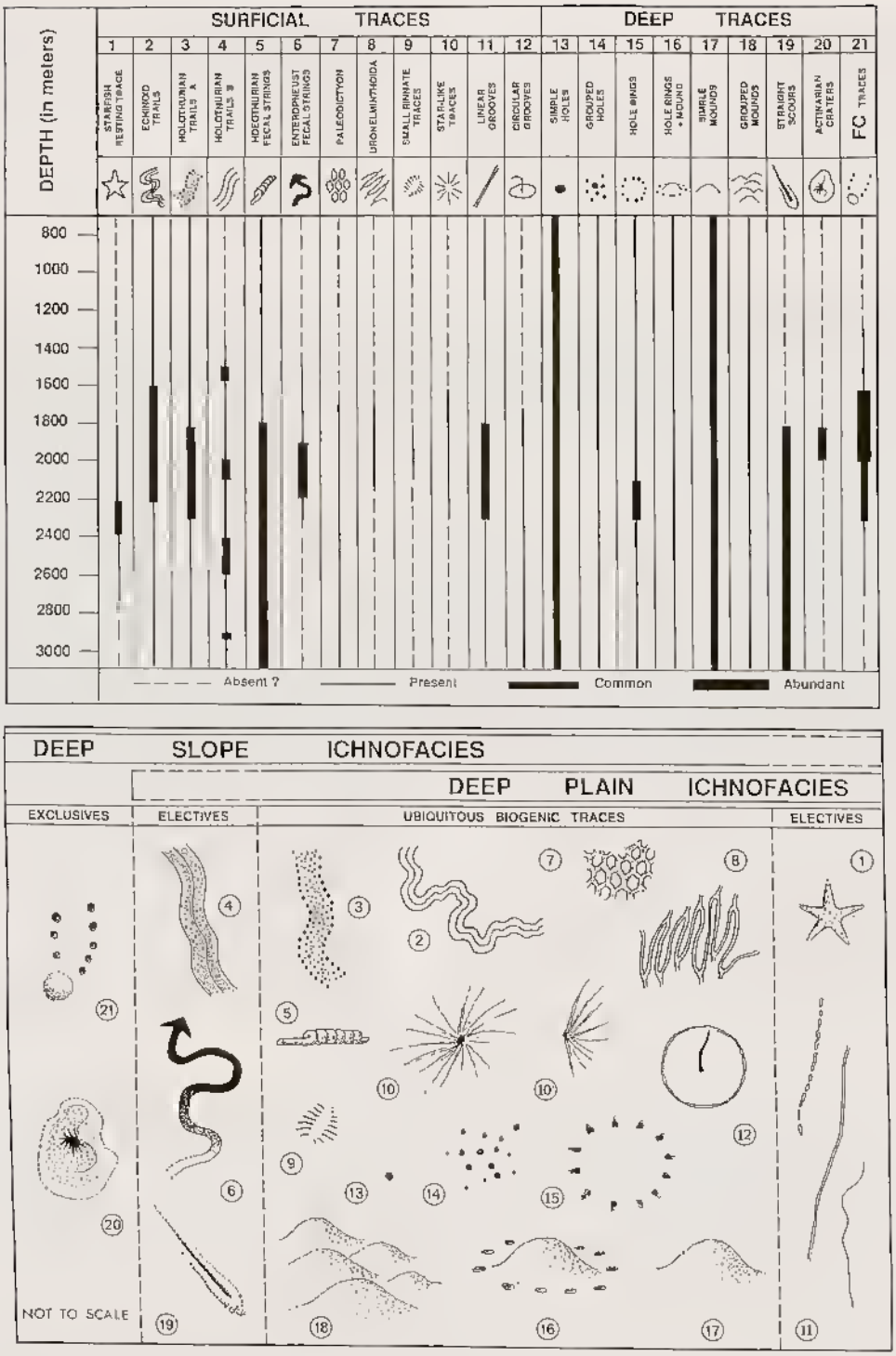


FIG. 20. — Diversity and bathymetric range of traces and burrows off New Caledonia (from GAILLARD, 1991b).

FIG. 20. — Diversité et distribution bathymétrique des traces et terriers au large de la Nouvelle-Calédonie (d'après GAILLARD, 1991b).

Generally speaking, the role played by both biocorrosion and bioturbation would seem to be essential to the sedimentary dynamics of the zones we explored, and to the evolution of benthic populations, particularly as regards to the relative importance of the sessile epifauna.

Source : MNHN, Paris

4. - A word about "living fossils"

One of the most interesting aspects of the bathyal fauna of New Caledonia is the apparently high number of taxa with what we might call an "archaic" stamp to them, "living fossils", relics of the fauna of the jurassic and cretaceous Tethys Ocean. This phenomenon is particularly spectacular among the stalked crinoids (AMÉZIANE-COMINARDI *et al.*, 1987 and 1990; BOURSEAU *et al.*, 1991) (figs 24-4 and 24-5), among the sponges, with the presence of sphinctozoans (VACELET *et al.*, 1992) (fig. 21-6) and among the pterobranches. The pterobranch species *Cephalodiscus graptoloides*, collected during the CALSUB cruise, and identified as a specimen of interest by H. ZIBROWIUS, has an astonishing ressemblance to graptolites, a group considered to have been extinct since the Carboniferous (DILLY, 1993; RIGBY, 1993). Note also the discovery of a new line of evolution among the deep sea ascidians, *Fimbrora calsubia*, which shows a new type of adaptation to macrophagy (MONNIOT & MONNIOT, 1991)

Up until the Lower Cretaceous, New Caledonia formed part of the eastern edge of Gondwana. When Gondwana broke up, New Caledonia separated from Australia and then drifted towards the lower latitudes which, from a climatic point of view, may have in some way made up for the very noticable cooling during the second half of the Cenozoic, which was to cause the Quaternary glaciation. During the most recent glacial maximum, the level of the sea dropped by 120 m, causing the New Caledonian lagoon to emerge completely and destabilising the upper portion of the bathyal slope. In any case, it is difficult to imagine that conditions in the New Caledonian environment have remained unchanged since the Mesozoic.

The CALSUB cruise demonstrated that there is a great variety of ecological niches, but also a relative instability (both sedimentological and hydrological) in the epibathyal zone of New Caledonia (LAMBERT & ROUX, 1991). From 1000 m downwards, the environment seems to be more stable and the populations more homogeneous, as in the Central Pacific.

When we talk of "living fossils", we may be talking of two things; on the one hand, they may be veritably panchronic forms (slow or imperceptible evolution), or, on the other hand, forms that have undergone a more recent paedomorphic evolution, leading to a phenotypic convergence with ancient forms (AMÉZIANE-COMINARDI & ROUX, 1994). Only a certain permanence in the conditions of the environment allows us to assume the first possibility, unless we are dealing with extremely opportunist taxa, capable of surviving great environmental changes.

In fact, the conditions for survival of ancestral forms depend a great deal on the autecology of each taxon and we must therefore beware of making generalizations on the basis of the analysis of a single group of organisms.

CONCLUSION

The bathyal domain of New Caledonia is currently one of the best known in the Pacific, as much in terms of the inventories of fauna as in terms of the direct observation of its populations by submersible. The CALSUB cruise has shown the great diversity of the ecological niches, particularly on the epibathyal beds, of which it explored only a very small portion. It remains to explore in more detail the populations of fauna which develop at the summit of guyots.

In spite of the considerable exploration efforts made, and given the diversity of the substrate and of the environmental conditions, our knowledge of the New Caledonian bathyal fauna and its ecology still remains very sketchy, particularly in regard to the rocky beds, where only the use of a submersible allows significant progress. We see therefore how difficult it is to gain an idea of the real originality of the fauna in this region of the Western Pacific. Its apparent originality is due in part to the absence or rarity of similar data from other areas of the same ocean. The "living fossils" aspect, however spectacular it might seem, is probably more a reflection of a lack of knowledge about the current bathyal benthos and of gaps in paleontological records, than an indication of the existence of a New Caledonian sanctuary for fauna directly descended from the most distant geological eras. However, we must not exclude from our study the unusual historical and climatic factors. It remains now for further cruises to demonstrate these things, cruises which will be better targeted thanks to the invaluable direct observations made by the CALSUB cruise.

Source : MNHN, Paris

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Source : MNHN, Paris

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Source : MNHN, Paris

FIGURE 21

1. — Algal bed supporting large gorgonian communities. S of Santal Bay, W of Lifou. Depth 80 m. Dive 11; observer J.-P. BOURSEAU.

1. — Trottoir algaire supportant une prairie de grandes gorgones. Sud de la baie du Santal à l'ouest de Lifou. Profondeur 80 m. Plongée 11; observateur J.-P. BOURSEAU.

2. — Algal bed covering a dome and supporting lithistid sponges, gorgonians and anthipatharians. SW of the Isle of Pines. Depth 60 m. Dive 18; observer P. BOUCHET.

2. — Dôme couvert d'une construction algaire supportant des éponges lithistides, des gorgones et des antipathaires. SW de l'île des Pins. Profondeur 60 m. Plongée 18; observateur P. BOUCHET.

3. — Algal bed. S of Santal Bay. Depth 80 m. Dive 11; observer J.-P. BOURSEAU.

3. — Trottoir algaire. Sud de la baie du Santal. Profondeur 80 m. Plongée 11; observateur J.-P. BOURSEAU.

4. — Large holothurian (about 80 cm long) on a slope with algal balls and bioclastic sand. S of Santal Bay. Depth 130 m. Dive 11; observer J.-P. BOURSEAU.

4. — Grande holothurie (environ 80 cm) sur une pente à boulets algaires et sable bioclastique. Sud de la baie du Santal. Profondeur 130 m. Plongée 11; observateur J.-P. BOURSEAU.

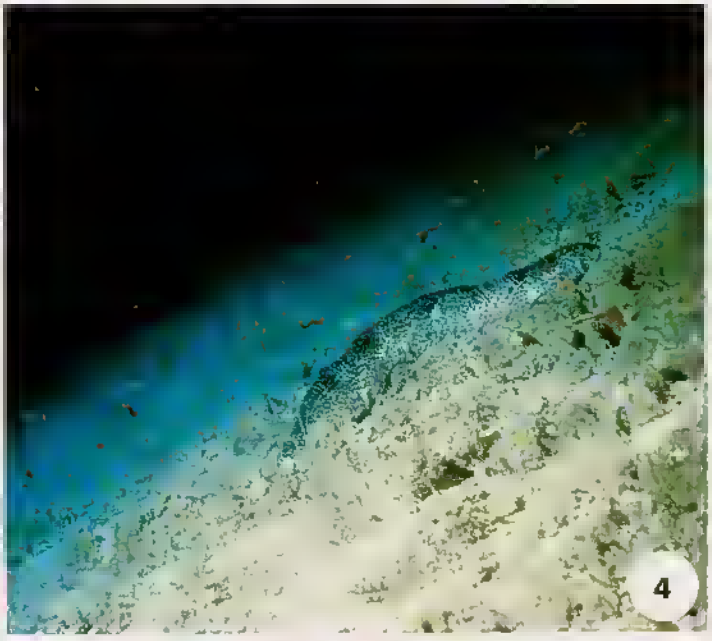
5. — Large coniform sponges on an escarpment encrusted with small sponges (biocorrosion?). N of Santal Bay. Depth 380 m. Dive 05; observer R. GRANDPERRIN.

5. — Grandes éponges en cornet sur une paroi incrustée de petites éponges (biocorrosion ?). Nord de la baie du Santal. Profondeur 380 m. Plongée 5; observateur R. GRANDPERRIN.

6. — Small decimetrical structure of sphinctozoan sponge (*Vaceletia*) observed at a depth of around 240 m in Santal Bay (photograph taken by J. VACELET).

6. — Petit massif décimétrique construit par les sphinctozoaires (*Vaceletia*) observés vers 240 m dans la baie du Santal (cliché J. VACELET).

Source : MNHN, Paris



Source : MNHN, Paris

FIGURE 22

1. — Cavern carpeted with gorgonians, bryozoans and comatulid crinoids, home to a dense shrimp population of the genus *Plesionika*. Santal Bay. Depth 180 m. Dive 10; observer C. MONNIOT.

1. — Grotte tapissée de gorgones, bryozoaires, comatules et abritant une population de crevettes du genre *Plesionika*. Sud de la baie du Santal. Profondeur 180 m. Plongée 10; observateur C. MONNIOT.

2. — Overhang at the top of a fault escarpment (see fig. 12) - side view. On the lower surface, zoantharians; on the edge, brissingid sea stars; on the upper surface, ophicanthid and euryalid brittle stars. S of the Isle of Pines. Depth 584 m. Dive 20; observer A. GUILLE.

2. — Surplomb au sommet d'un escarpement de faille, vue de profil (cf. fig. 12). En dessous : zoanthaires ; à l'extrémité : astérides brissingidées ; au-dessus : ophiures ophiacanthidées et euryales. Sud de l'île des Pins. Profondeur 584 m. Plongée 20; observateur A. GUILLE.

3. — Dense echinoderm population at the top of the same fault escarpment (see fig. 12). Same location. Depth 597 m. Dive 22; observer M. ROUX.

3. — Agrégat d'échinodermes au sommet d'un escarpement de faille (cf. fig. 12). Même lieu. Profondeur 597 m. Plongée 22; observateur M. ROUX.

4. — Upper surface of the same escarpment entirely covered by ophiacanthid brittle stars. Same dive. Same depth.

4. — Même lieu, population d'ophiures ophiacanthidées sur le replat sommital. Même profondeur, même plongée.

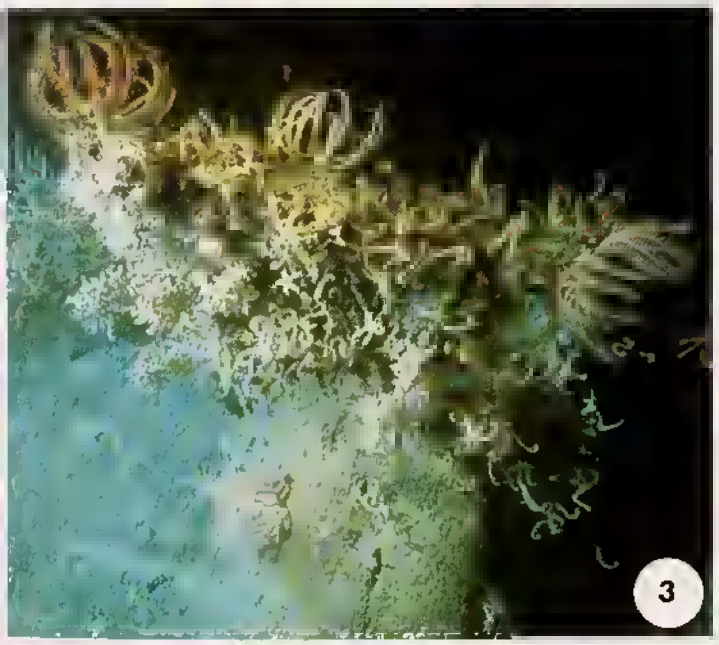
5. — Slab of rock covered at regular intervals by small gorgonians (in the background), and, in the foreground, a large gorgonian of the genus *Calyptrophora* supporting an euryalid brittle star with partially retracted arms (on the left). N slope of the Ouvéa-Lifou rise. Depth 355 m. Dive 15; observer A. GUILLE.

5. — Dalle régulièrement couverte de petites gorgones (en arrière-plan) et de plus grandes du genre *Calyptrophora* (au premier plan) supportant une euryale aux bras en partie rétractés (à gauche). Versant nord du seuil Ouvéa-Lifou. Profondeur 355 m. Plongée 15; observateur A. GUILLE.

6. — Lithistid sponge (*Corallistes undulatus*), diameter 30 to 40 cm. The sea floor is covered by terebratulid brachiopods (small shadows). SW of the Isle of Pines. Depth 330 m. Dive 21; observer B. RICHER DE FORGES.

6. — Eponge lithistide (*Corallistes undulatus*), 30 à 40 cm de diamètre, sur un fond riche en brachiopodes (térébratules) dont la présence est ici soulignée par leur ombre. SW de l'île des Pins. Profondeur 330 m. Plongée 21; observateur B. RICHER DE FORGES.

Source : MNHN, Paris



Source : MNHN, Paris

FIGURE 23

1. — Group of *Nautilus macromphalus* attracted to a bait. SW of the Isle of Pines. Depth 413 m. Dive 19; observer M. SEGONZAC.

1. — Groupe de *Nautilus macromphalus* attirés par un appât. SW de l'île des Pins. Profondeur 413 m. Plongée 19; observateur M. SEGONZAC.

2. — Allochthonous blocks and pebbles from a collapsed algal bed mixed with a group of autochthonous nautilus shells. Northern slope of the Ouvéa-Lifou rise. Depth 360 m. Dive 16; observer M. ROUX.

2. — Blocs éboulés et graviers provenant d'un trottoir algaire mélangés à une concentration de coquilles de nautiles autochtones. Versant septentrional du seuil Ouvéa-Lifou. Profondeur 360 m. Plongée 16; observateur M. ROUX.

3. — Population of cidarid sea-urchins on a steeply inclined slab of rock. Same location. Depth 370 m. Dive 15; observer A. GUILLE.

3. — Population de cidaridés (échinides réguliers) sur une dalle pentue. Même lieu. Profondeur 370 m. Plongée 15; observateur A. GUILLE.

4. — Dense macrofauna in a sheltered area (bryozoans, sponges, scleractinians, ascidians, etc.). S. of Santal Bay. Depth 525 m. Dive 09; observer J. VACELET.

4. — Macrofaune plus dense dans une zone abritée (bryozoaires, éponges, scléractiniaires, ascidies, etc...). Sud de la baie du Santal. Profondeur 525 m. Plongée 09; observateur J. VACELET.

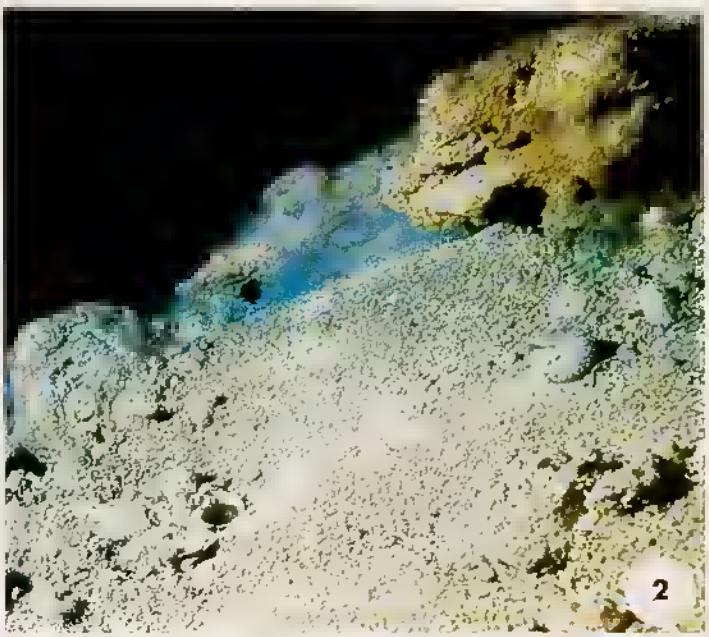
5. — Hexactinellid sponge attached to a slab of rock by a thick cushion of spicules. Northern slope of the Ouvéa-Lifou rise. Dive: 16; observer M. ROUX.

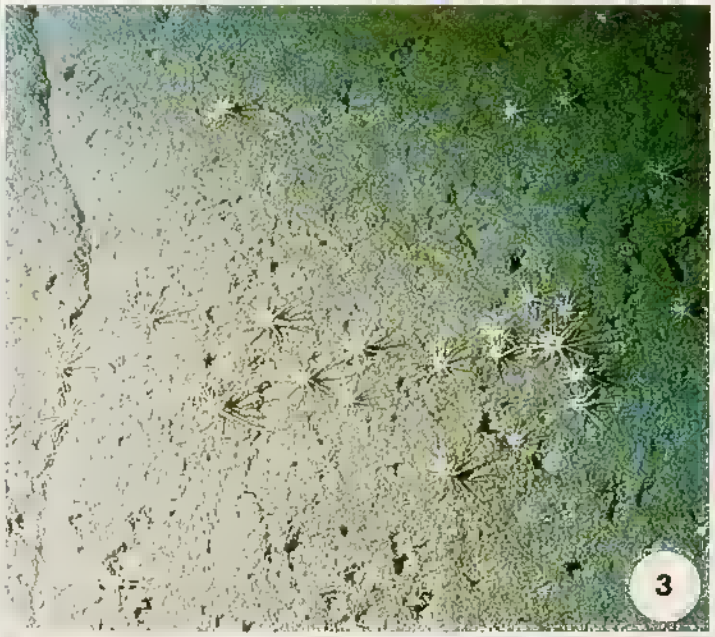
5. — Eponge hexactinellide sur une dalle rocheuse fixée par un coussin de spicules. Versant septentrional du seuil Ouvéa-Lifou. Plongée 16; observateur M. ROUX.

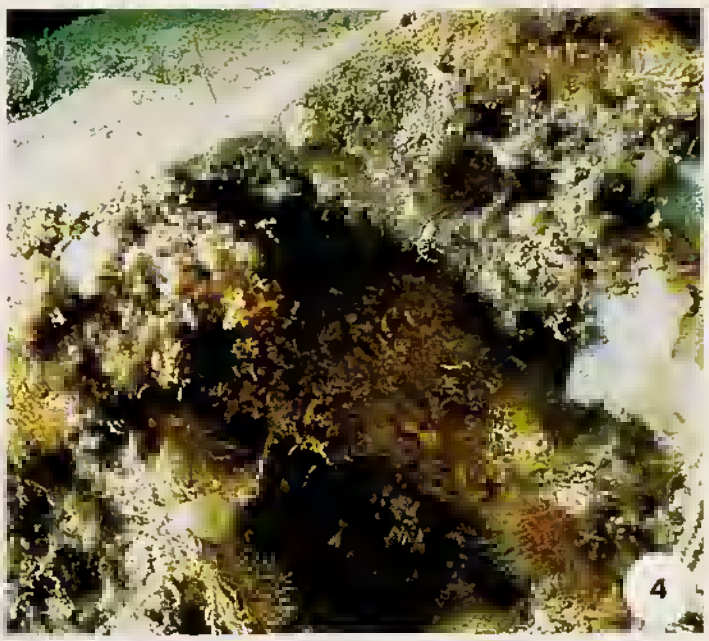
6. — Tree uprooted by a storm lying on the sea floor at a depth of 1834 m. Notice the galatheid shrimps (*Munidopsis*) grasping the roots. NE of Thio. Dive 17; observer C. GAILLARD.

6. — Epave d'un arbre déraciné par un cyclone. On distingue des galathées (*Munidopsis*) accrochées aux racines. NE de Thio. Profondeur 1834 m. Plongée 17; observateur C. GAILLARD.

Source : MNHN, Paris







Source : MNHN, Paris

FIGURE 24

1. — Hexactinellid sponge (*Monorhaphis*), 50 to 80 cm long. N of Santal Bay. Depth 875 m. Dive 08; observer B. LAURIN.

1. — Eponge hexactinellide (*Monorhaphis*), longueur 50 à 80 cm. Nord de la baie du Santal. Profondeur 875 m. Plongée 08; observateur B. LAURIN.

2. — Dense population of *Monorhaphis*. The spicule of a number of dead specimens is covered by epibiontic macrofauna. Depth 816 m. Same dive.

2. — Champ de *Monorhaphis*, comportant de nombreux individus morts dont le spicule est couvert par les épibiontes. Profondeur 816 m. Même plongée.

3. — Ophiacanthid and euryalid brittle stars perched on the axis of a dead gorgonian. NE of Thio. Depth 1627 m. Dive 13 ; observer M. SEGONZAC.

3. — Ophiures (ophiacanthidées et euryales) perchées sur un axe de gorgone morte. NE de Thio. Profondeur 1627 m. Plongée 13; observateur M. SEGONZAC.

4. — Stalked crinoid with jurassic affinities (*Proisocrinus ruberrimus*). N of Lifou. Depth 1254 m. Dive 02; observer M. ROUX.

4. — Crinoïde pédonculé d'affinités jurassiques (*Proisocrinus ruberrimus*). Nord de Lifou. Profondeur 1254 m. Plongée 02; observateur M. ROUX.

5. — Stalked crinoid with paleozoic affinities (*Guillecrinus neocaledonicus*). Depth 1276 m. Same dive.

5. — Crinoïde pédonculé d'affinités paléozoïques (*Guillecrinus neocaledonicus*). Profondeur 1276 m. Même plongée.

6. — Hexactinellid stalked sponge (*Hyalonema*) with a comatulid crinoid attached to the upper part of the stalk. N of Lifou. Depth 1820 m. Dive 01; observer C. MONNIOT.

6. — Eponge hexactinellide pédonculée (*Hyalonema*) avec une comatule fixée au sommet du pédoncule. Nord de Lifou. Profondeur 1820 m. Plongée 01; observateur C. MONNIOT.

7. — Euplectellid sponge (Hexactinellid sponge) about 1,5 m in height. N of Lifou. Depth 2116 m. Dive 02; observer M. ROUX.

7. — Euplectelle (Eponge hexactinellide) d'environ 1,5 m de haut. N. de Lifou. Profondeur 2116 m. Plongée 02; observateur M. ROUX.

Source : MNHN, Paris

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Source : MNHN, Paris

FIGURE 25
(from GAILLARD, 1991a, courtesy of the author)

1. — Two heavily eroded beds at the top of a cliff. The cavities are in part ancient burrows, but may also be recent borings, testifying to active bioerosion. Hemipelagic semi-indurated calcereous ooze. Thio slope. Depth 1871 m. Dive 17; observer C. GAILLARD.

1. — Deux bancs en sommet de relief soumis à une intense érosion. Les cavités sont pro parte des anciens terriers, mais peut-être également pro parte des perforations récentes témoignant d'une biocorrosion active. Boue calcaire hémipélagique semi-indurée. Pente de Thio. Profondeur 1871 m. Plongée 17; observateur C. GAILLARD.

2. — Rocky cliff showing a dense sponge community and traces of bioerosion. Santal Bay. Depth 376 m. Dive 09; observer J. VACELET.

2. — Paroi rocheuse montrant un peuplement dense d'éponges incrustées dans la roche et des traces de biocorrosion. Baie du Santal. Profondeur: 376 m. Plongée 09; observateur J. VACELET.

3. — Part of a high cliff (around 20m) with well stratified semi-indurated calcareous oozes. Note the abundance of biogenic cavities on vertical walls. Slope off Thio. Depth 1886 m. Dive 17; observer C. GAILLARD.

3. — Vue partielle d'une falaise importante (environ 20m) dans des boues calcaires semi-indurées bien stratifiées. Noter l'abondance des cavités d'origine biologique sur les parois verticales. Pente au large de Thio. Profondeur: 1886 m. Plongée 17; observateur C. GAILLARD.

4. — Collapsed semi-indurated blocks, settled on hemipelagic muds. Note the numerous biogenic cavities on these blocks and the actinian attached to the smaller one. Echinoids (?) trails are visible on the muddy area. Slope off Thio. Depth: 1726 m. Dive 13; observer M. SEGONZAC.

4. — Blocs semi-indurés écroulés, isolés au sein des boues hémipélagiques. Noter les nombreuses cavités d'origine biologique qu'ils renferment et l'actinie fixée sur le plus petit d'entre eux. Des pistes d'échinides (?) sont visibles dans la zone boueuse. Pente au large de Thio. Profondeur: 1726 m. Plongée 13; observateur M. SEGONZAC.

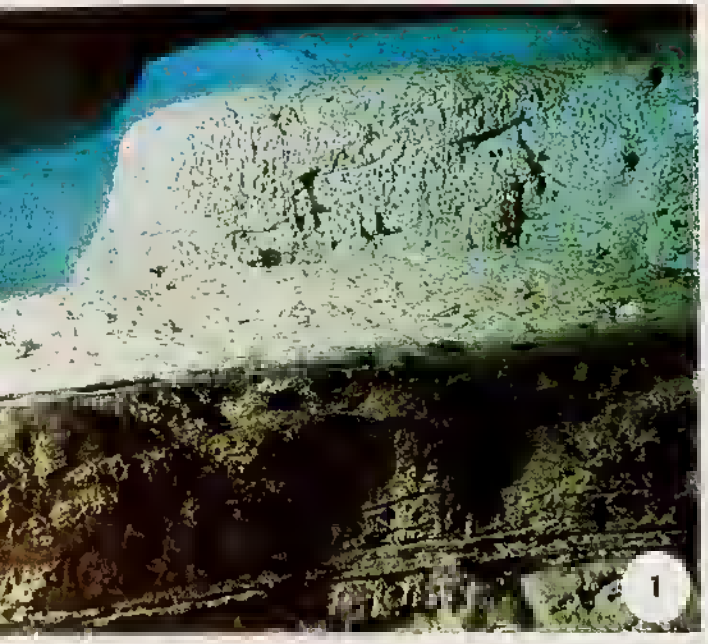
5. — A crab at the entrance of its burrow. S of Santal Bay. Depth 603 m. Dive 09; observer J. VACELET.

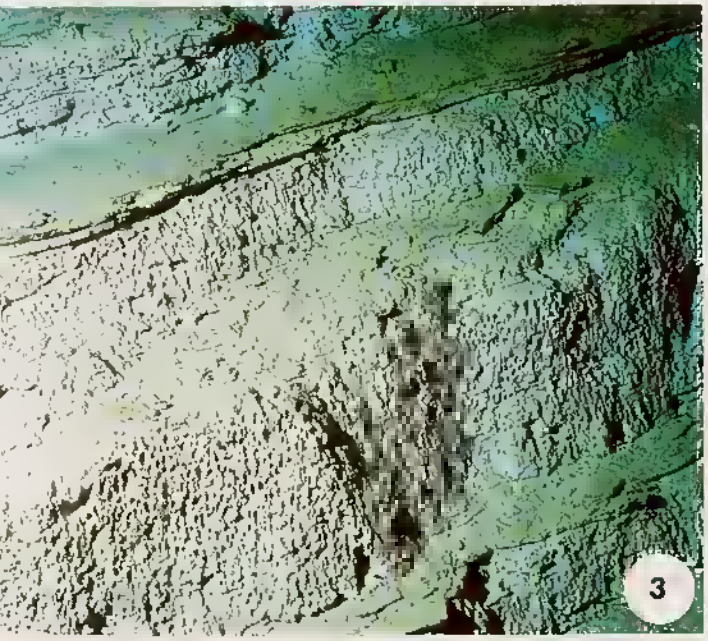
5. — Crabe devant l'entrée de son terrier. S de la baie du Santal. Profondeur 603 m. Plongée 09; observateur J. VACELET.

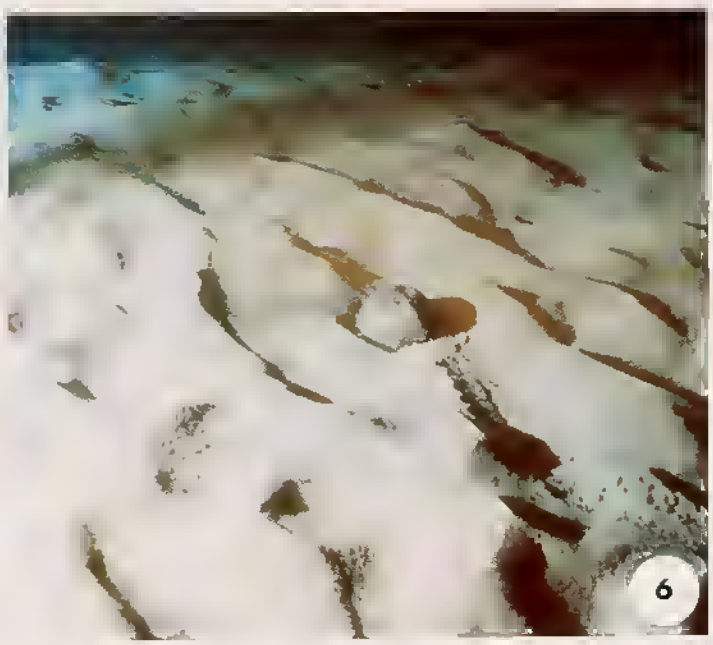
6. — Sea urchin belonging to the genus *Taimanawa* at the end of its track. Megaripple covered with ripple-marks. Gulley off SW of Isle of Pines. Depth 596 m. Dive 22; observer M. ROUX.

6. — Oursin irrégulier du genre *Taimanawa* à l'extrémité de sa piste. Mégaride couverte de ripple marks. Gouttière au SW de l'île des Pins. Profondeur 596 m. Plongée 22; observateur: M. ROUX.

Source : MNHN, Paris







Source : MNHN, Paris

FIGURE 26
(from C. GAILLARD, 1991a, courtesy of the author)

1. — Superficial muddy sediment wholly bioturbated by holothurians (aproximate width 10 cm). North-Lifou slope. Depth 2459 m. Dive 3; observer M. RIO.

1. — Sédiment superficiel boueux entièrement bioturbé par des holothuries (largeur des pistes 10 cm environ). Pente N. de Lifou. Profondeur 2459 m. Plongée 03; observateur M. RIO.

2. — Tumulus encircled by burrows (approximate total diameter 30 cm). Slope off Thio. Depth 1851 m. Dive 17; observer C. GAILLARD.

2. — Tumulus entouré de terriers (diamètre total 30 cm environ). Pente de Thio. Profondeur 1851 m. Plongée 17; observateur C. GAILLARD.

3. — Holothurian trail (approximate width 6-10 cm). Slope off Thio. Depth 1663 m. Dive 13; observer M. SEGONZAC.

3. — Piste d'holothurie (largeur approximative 6-10 cm). Talus de Thio. Profondeur 1663 m. Plongée 13; observateur M. SEGONZAC.

4. — Circle of holes (approximate diameter 30 cm). Slope off Thio. Depth 2032 m. Dive 17; observer C. GAILLARD.

4. — Terriers en cercle (diamètre 30 cm environ). Talus de Thio. Profondeur 2032 m. Plongée 17; observateur C. GAILLARD.

5. — Straight groove (approximate length 50 cm). Slope off Thio. Depth 1865 m. Dive 17; observer C. GAILLARD.

5. — Souille rectiligne (longueur environ 50 cm). Talus de Thio. Profondeur 1865 m. Plongée 17; observateur C. GAILLARD.

6. — FC trace ichnofacies. Hemipelagic calcareous ooze. Slope off Thio. Depth 1798 m. Dive 17; observer C. GAILLARD.

6. — Ichnofaciès à traces FC. Boues calcaires hémipélagiques. Talus au large de Thio. Profondeur: 1798 m. Plongée 17; observateur C. GAILLARD.

7. — Cluster of tumuli (approximate diameter of one tumulus 10 to 20 cm). Slope off Thio. Depth 1693 m. Dive 13; observer M. SEGONZAC.

7. — Tumulus groupés (diamètre de chaque tumulus 10 à 20 cm environ). Pente au large de Thio. Profondeur 1693 m. Plongée 13; observateur M. SEGONZAC.

8. — Trace FC (approximate total length 20-30 cm). SW slope of New Caledonia (BIOGEOCAL, CB 203, depth 2000 m).

8. — Trace FC (longueur hors-tout 20 à 30 cm environ). Pente SW Nouvelle-Calédonie (BIOGEOCAL, CB 203, profondeur 2000 m).

9. — Enteropneust (?) on muddy hemipelagic bed (approximate length of the body 15-20 cm). Lower SW slope of Lifou (BIOGEOCAL, CB 320, depth 2050 m).

9. — Entéropneuste (?) sur fond de boue calcaire hémipélagique (longueur du corps 15-20 cm environ). Bas de la pente SW de Lifou (BIOGEOCAL, CB 320, profondeur 2050 m).

Source : MNHN, Paris

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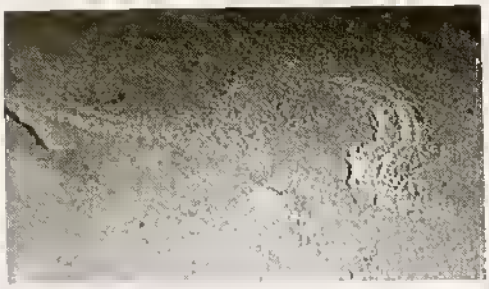

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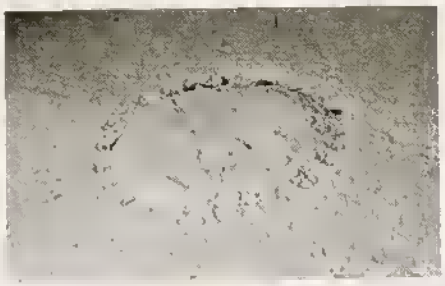

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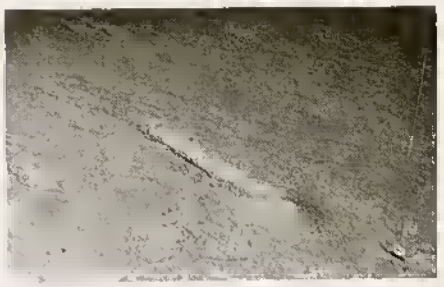

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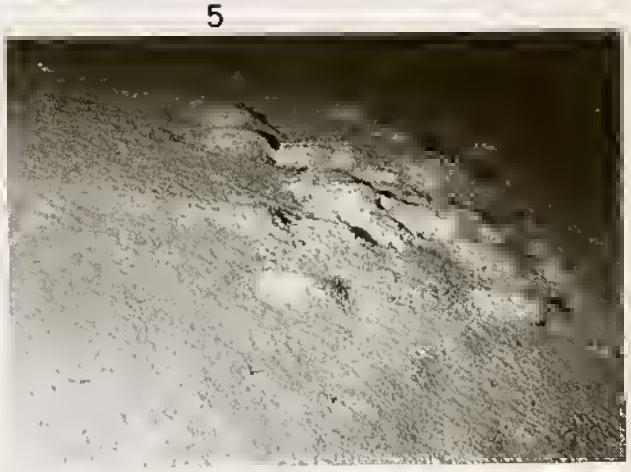

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Source : MNHN, Paris

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Protozoa Xenophyophorea Granuloreticulosa : *Psammina zonaria* sp. nov. from the West Pacific and some aspects of the growth of xenophyophores

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ABSTRACT

Psammina zonaria sp. nov. is the first member of this genus described from bathyal depths of the West Pacific. It is characterized by strong compartmentalization of the interior space and strictly directional growth. It appears to live attached to hard substrates, with the stiff but fragile test sticking up in the near-bottom water layer.

RÉSUMÉ

Protozoa, Xenophyophorea Granuloreticulosa : *Psammina zonaria* sp. nov. du Pacifique ouest. Considérations sur quelques aspects de la croissance des xenophyophores

Psammina zonaria sp. nov. est la première espèce du genre *Psammina* décrite des profondeurs bathyales du Pacifique Ouest. Elle se caractérise par un fort compartimentage de l'espace intérieur et une croissance strictement directionnelle. Elle semble vivre fixée à des substrats durs, avec son test, rigide mais fragile, dressé dans la couche d'eau se trouvant près du fond.

INTRODUCTION

Xenophyophores are macro- and megafauna-sized agglutinating rhizopods, mainly found in the deep sea (TENDAL, 1972, 1989). Although the present class Xenophyophorea was erected as an order, Xenophyophorida, of the Rhizopodea early in the century (SCHULZE, 1912), it is only over the last two decades that its wide geographical occurrence and ecological significance have become acknowledged beyond a narrow circle of deep-sea workers. The generalities, including terminology, are now accessible in larger textbooks (MARSHALL, 1979;

TENDAL, O. S., 1994. — Protozoa Xenophyophorea Granuloreticulosa : *Psammina zonaria* sp. nov. from the West Pacific, and some aspects of the growth of xenophyophores. *In* : A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Volume 12. *Mém. Mus. natn. Hist. nat.*, **161** : 49-54. Paris ISBN 2-85653-212-8.

Source : MNHN, Paris

PAGE, 1982; TENDAL, 1989; GAGE & TYLER, 1991; GOODAY & TENDAL, *in press*). The ecology of the group has attracted special interest in recent years (GOODAY *et al.*, 1993; LEVIN, 1991; LEVIN & THOMAS, 1988; LEVIN & GOODAY, 1992; RIEMANN *et al.*, 1993; TENDAL, 1985).

About 50 species of xenophyophores are formally named, and quite a few await formal description. Because most species are known from just a few records, and many only as fragments, any new find has the potential to bring substantial new information about the group.

The material secured during the MUSORSTOM 7 Expedition was collected from bathyal depths on the flat top of a seamount in the central West Pacific, north of the Fiji Islands, between the Combe and the Bayonnaise banks (RICHER DE FORGES & MENOU, 1993); this is the first record of a xenophyophore from that region. It also adds to our knowledge of the growth pattern of xenophyophores in general and the basic organization of members of the genus *Psammina* in particular.

METHODS

The samples were preserved in alcohol shortly after recovery.

Analysis of chemical constituents (Ba and S) was performed with an energy-dispersive X-ray spectrographic analyzer (EDS) connected to a scanning electron microscope (CamScan), which was run at 15 kV.

The holotype and one paratype are in the Muséum national d'Histoire naturelle, Paris, and two paratypes are in the Zoological Museum, University of Copenhagen.

SYSTEMATICS

Family PSAMMINIDAE Haeckel, 1889

Genus *PSAMMINA* Haeckel, 1889

Psammina zonaria sp. nov.

Fig. 1-2

MATERIAL EXAMINED. — **Wallis and Futuna Islands.** MUSORSTOM 7 : st. DW 620, 12°34.4'S, 178°11.0'W, 1280 m, clay, 28 May 1992, Warén dredge : Fourteen specimens and large fragments.

DIAGNOSIS. — A flat, elongate and spatulate *Psammina* with even increase in width from narrow to broad end. Up to 3 mm thick. Inner test space conspicuously compartmentalized by bars running across the whole width of the test. Colour white, consistency hard and brittle. Xenophyae planktonic foraminiferal shells of all sizes.

TYPE MATERIAL. — Two fragments in the sample fit together and form a large entire specimen selected as the holotype (Fig.1) and deposited in the Muséum national d'Histoire naturelle, Paris (registration number MNHN-489UV). It is spatulate in form, 26 mm (16 + 10 mm) long, 13 mm wide at one end and 4 mm at the other. A paratype is also deposited there (MNHN-490UV). Two paratypes in the Zoological Museum, University of Copenhagen, are without registration number.

DESCRIPTION. — There are three other nearly complete specimens in the sample, measuring in length, and greatest and smallest width, 15, 11, and 4 mm, 12, 9, and 4 mm and 10, 7, and 5 mm, respectively. The thickness is 2-3 mm.

Test : The tubular part is in all cases broken at the narrow end. As the tubular end gradually widens, the test becomes flattened and platelike, attaining the characterististic *Psammina* organization of two parallel plates of xenophyae with a space in between.

Source : MNHN, Paris

Both outer surfaces appear smooth apart from protruding xenophyae, but when examined more closely in oblique light it is seen that they are both slightly undulating, with about 3 mm from one crest to the next. The crests of the two test sides are arranged symmetrically. The test edges are rounded. Both test surfaces and the edges have numerous small openings, < 0.1 mm in diameter, which are probably the passages for pseudopodia, although some of them may be places where small xenophyae have fallen out. A number of larger holes, 0.5-1 mm in diameter, to the interior are merely damages. Granellare and stercomare branches are visible in some cases along the broad end, protruding among the xenophyae; they are not seen along the sides.

FIG. 1. — A : The holotype of *Psammina zonaria* sp. nov. — B : A fragment of *Psammina zonaria* sp. nov. One side is dissected away to show the interior compartmentalization. Scale in mm.

Xenophyae are planktonic foraminifer shells of all sizes, packed with the smaller ones well cemented as an infilling around the large ones.

The space between the plates, is 0.5-1 mm wide. The inner sides of the plates are connected by long solid, well cemented bars of xenophyae running across the whole width of the test and subdividing the interior space into long narrow, 1-2 mm wide compartments (Fig. 1 B). The bars are 0.5-1 mm wide, and the xenophyae are of the same kind as in the plates. The bars lack larger openings, but are occasionally crossed by branches of granellare and stercomare passing through small spaces between the xenophyae.

Granellare : The strings of granellare are sparsely developed and seem mostly to occur in the widest end, immediately under the test plates. The dichotomously dividing yellow-white branches are 100-120 µm in diameter; anastomoses are not seen. The plasma contains enormous numbers of granellae, up to 5 µm long. Their size, form, colour and distribution are as in other xenophyophores, and that the main constituent is $BaSO_4$ is confirmed by EDS analysis (Fig. 2).

Stercomare : The strings of stercomare are very strongly developed and fill the compartments completely (Fig. 1 B). The dark brown or black branches are 100-200 µm in diameter and anastomose in a tight network with open spaces about 0.1 mm in diameter. The covering membrane is thin but solid and slightly shiny. Rounded xanthosomes up to 12 µm in diameter are commonly seen among the masses of stercomata.

DISCUSSION

REMARKS ON TAXONOMY. — Because of the basic test construction, (two well defined plates of xenophyae connected by pillars or bars) the species is placed in the genus *Psammina* Haeckel, 1889. Six other species are presently referred to the genus. Superficially, a broken specimen of *P. zonaria* can be mistaken for *P. globigerina*

Source : MNHN, Paris

Haeckel, 1889, or maybe *P. plakina* Haeckel, 1889, a poorly known species (TENDAL, 1972 : 33), but the pronounced compartmentalization of the inner test space is a clear difference from these species. Large specimens of *P. globigerina* may have irregularly distributed bar-like pillars between the plates, but these do not compartmentalize the interior space. The only other known species with well defined bars is *P. sabulosa* Gooday & Tendal, 1988, but here the bars are regularly perforated by large openings, and the xenophyae are well sorted sandgrains.

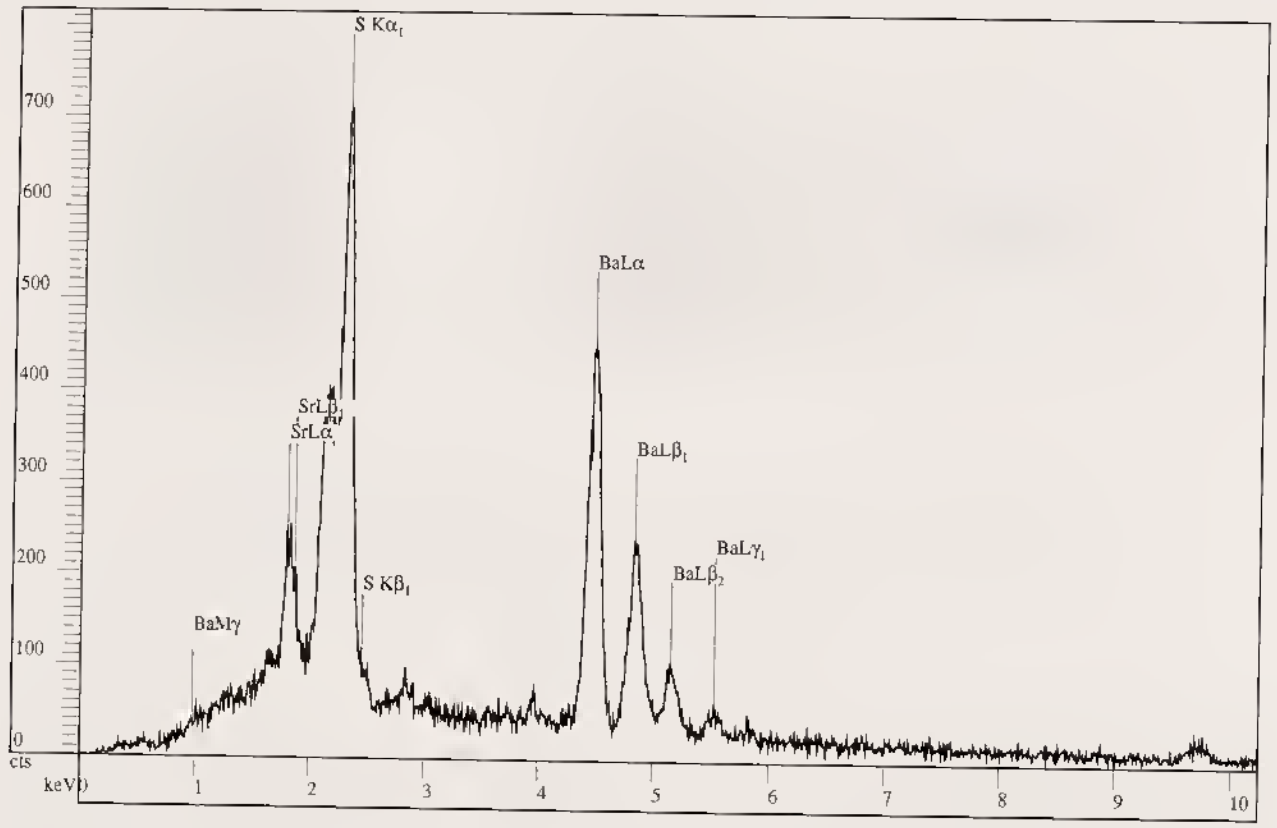

FIG. 2. — EDS elemental analysis of a single crystal in dried plasma of *Psammina zonaria* sp. nov. The peaks show the main constituents to be barium (Ba) and sulphur (S), with a trace of strontium (Sr).

GROWTH. — The compartmentalization reflects a distinct growth pattern showing a striking resemblance to that of a number of other xenophyophore species, viz *Psammina sabulosa* Gooday & Tendal, 1988, *Stannophyllum zonarium* Haeckel, 1889, *S. globigerinum* Haeckel, 1889, *S. granularium* Tendal, 1972, *S. fragilis* Tendal, 1972 and *S. flustraceum* Haeckel, 1889. The explanation might be found in the very important phenomenon of episodic growth recently discovered in the xenophyophore *Reticulammina labyrinthica* from the Madeira abyssal plain in the Atlantic (GOODAY *et. al.*, 1993).

P. zonaria has directed growth, the narrow part being the oldest, the wide part the youngest. This can be seen from the distribution of granellare which are only present in the youngest part of the test. The tubular oldest part can be considered a juvenile stage; thus, *P. zonaria* is a new example within the xenophyophores of young specimens having another body form than the older ones (TENDAL, 1972 : 80). The existence of strong morphological differences between two parts of the same specimen implies the risk that an isolated fragment is attributed a wrong taxonomic placement, a phenomenon also evident in other xenophyophores (GOODAY, 1991 : 210).

LIFE POSITION. — Some *Psammina* species have been found on the surface in box cores, on soft sediment (LEVIN & THOMAS, 1988); they may initially have started to grow on some small hard object. Further, there are many photographs from deep-sea bottoms showing supposed *Psammina* specimens on the sediment surface.

Source : MNHN, Paris

sometimes among or maybe on manganese nodules (TILOT, 1992, and unpubl.; TENDAL, unpubl.). Accordingly, the main part of the body of at least some *Psammina* species protrudes into the water above the bottom. In *P. zonaria* all the tubular parts are open at one end, have the same dimensions, and are still filled with stercomare. This suggests that they do not represent an area that gradually dies off and decomposes; it is more likely that they were originally fixed to a hard substrate, the brittle test breaking at the weakest point, probably just above the base. All evidence taken together thus suggests that *P. zonaria* lives upright on some solid substrate.

GENERAL ECOLOGY. — The sampling locality lies close to the summit of a seamount (RICHER DE FORGES & MENOU, 1993). *Psammina zonaria* was found in a sample taken with a Warén dredge, while four other samples from the same area, three of them taken with a fish trawl and the last with an epibenthic sledge, yielded no xenophyophores, perhaps because these fragile organisms were fragmented beyond recognition. It is difficult to conclude anything on this, but it should be pointed out that xenophyophores are abundant near the summits of many eastern Pacific seamounts, probably because intensification of currents in these places leads to enhanced flux of suspended food particles (LEVIN & THOMAS, 1988).

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Source : MNHN, Paris

3

Bryozoa : Living and fossil species of the catenicellid subfamilies Ditaxiporinae Stach and Vasignyellinae nov.

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ABSTRACT

The discovery of living species of the predominantly Tertiary catenicellid subfamily Ditaxiporinae on the Norfolk Ridge has necessitated a revision of the subfamily, which is characterised by biseriate multizooidal segments. The type species of the genera of Ditaxiporinae and of the related family Ditaxiporinidae were examined by scanning electron microscopy, leading to the recognition of six genera (two new) and 18 species (four new) and the incorporation of the Ditaxiporinidae into the Ditaxiporinae. The earliest occurring species is *Caberoides rockallensis* sp. nov. in the late Paleocene of the North Atlantic. There are only two living species - *Bryosartor sutilis* gen. et sp. nov. and *Plagiopora recens* Gordon, both on the northern Norfolk Ridge. A new monotypic genus, *Ahcheethamia*, is introduced for *Caberoides corniculatus* Cheetham from the British Eocene. With the exception of two species from North America, the subfamily is clustered in two centres of diversity - northwestern Europe and Australasia, the latter including *Caberoides miranda* sp. nov. and *Plagiopora alma* sp. nov., both newly recorded from the Eocene of New Zealand. Thus a Tethyan distribution of the subfamily was achieved relatively early in the Paleogene.

Just as in other catenicellids, there seem to have been parallel trends in the Ditaxiporinae in the diversification of the frontal shield from a spinocyst to a perforated gymnocyst on the one hand and with cryptocystal elements (derived from expanded shallow pore-chambers) on the other. A unique development is indicated by the genus *Vasignyella*. Hitherto

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Source : MNHN, Paris

included in the family Savignyellidae, *Vasignyella* appears to have been derived from *Ditaxiporina* or a common ancestor by reduction to unizooidal segments and the loss of ovicells. A new subfamily of Catenicellidae, Vasignyellinae, is established for this genus.

RÉSUMÉ

Bryozoa : Espèces vivantes et fossiles des sous-familles catenicellides : Ditaxiporinae Stach et Vasignyellinae nov.

La découverte, sur la ride de Norfolk, d'espèces vivantes appartenant à la sous-famille catenicellide des Ditaxiporinae, surtout répandue au Tertiaire, a conduit à la révision de cette sous-famille caractérisée par des segments à nombreux zooïdes bisériés. Les espèces type des genre des Ditaxiporinae et de la famille des Ditaxiporinidae ont été examinées au MEB. Ceci a conduit à reconnaître six genres (dont deux nouveaux) et 17 espèces (dont trois nouvelles) et à incorporer les Ditaxiporinidae dans les Ditaxiporinae. L'espèce la plus ancienne est *Caberoides rockallensis* sp. nov. du Paléocène supérieur de l'Atlantique nord. Seules deux espèces actuelles existent, *Bryosartor sutilis* gen. et sp. nov. et *Plagiopora recens* Gordon, toutes deux sur la partie nord de la ride de Norfolk. Un nouveau genre monotypique, *Ahcheethamia*, est créé pour *Caberoides corniculatus* Cheetham de l'Éocène d'Angleterre. A l'exception de deux espèces trouvées en Amérique du Nord, la sous-famille se regroupe suivant deux centres de diversification : le Nord-Ouest de l'Europe et l'Australasie, le second incluant *Caberoides miranda* sp. nov. et *Plagiopora alma*, récemment trouvées toutes deux dans l'Éocène de Nouvelle-Zélande. Ainsi une distribution téthysienne de la sous-famille a été réalisée relativement tôt dans le Palaeogène.

De même que chez les autres catenicellides, il semble y avoir eu des tendances parallèles chez les Ditaxiporinae dans la diversification du bouclier frontal, depuis un spinocyste jusqu'à un gymnocyste perforé d'une part et avec des éléments cryptocystiques (dérivés de chambres porales peu profondes, dilatées) d'autre part. Le genre *Vasignyella* présente un développement unique. Inclus jusqu'à présent dans la famille des Savignyellidae, *Vasignyella* semble dérivé de *Ditaxiporina* ou d'un ancêtre commun, par réduction à des segments à un seul zooïde et la perte d'ovicelles. Une nouvelle sous-famille de Catenicellidae, celle des Vasignyellinae, est créée pour ce genre.

INTRODUCTION

Among the Bryozoa collected by the MUSORSTOM cruises in New Caledonian waters were some taxa of the cheilostomate superfamily Catenicelloidea that were either previously known only from the Tertiary of Victoria, Australia (*Chelidozoum*), or which have their earliest representation there (*Petalostegus*, Petalostegidae, and Ditaxiporinae) (GORDON & D'HONDT, 1991; GORDON, 1993). The latter taxon, Ditaxiporinae, is a subfamily of the Catenicellidae, a fairly widely distributed family with its greatest abundance in the Australasian region. Until recently, when a new species attributed to *Plagiopora* was discovered on the Norfolk Ridge north of Norfolk Island (GORDON, 1989a), the Ditaxiporinae was thought to be extinct. Now a new genus, with a major ancestral feature, has been discovered in the MUSORSTOM collections from New Caledonia. Its discovery provides a much-needed opportunity to revise and discuss the relationships of the whole subfamily Ditaxiporinae.

The Catenicellidae Busk, 1852 is a very distinctive and well-circumscribed family. The bushy colonial morphology is characteristic, with branches comprising long chains of uni- to multizooidal segments separated by chitinous joints. This characteristic morphology fortunately permits the classification of some very disparate zooidal morphologies in the one family (BANTA & WASS, 1979). It is this varied zooidal morphology that is the most remarkable feature of the family, comprising a range of frontal-shield types that elsewhere in the order Cheilostomatida might each have significance at the family level. Nevertheless, within the Catenicellidae it is possible to determine ancestral and derived characters and consequent polarities, permitting the construction of morphological lineages. Thus, the presence of a field of costal spines is an ancestral character, a lack of spines and a concomitant extensive gymnocyst a derived character. Similarly, any kind of cryptocystal feature is derived. Appropriately, the oldest-known catenicellid, from the Maastrichtian (Upper Cretaceous) of Jamaica (CHEETHAM, pers. comm. *in* BANTA & WASS, 1979 : 22) resembles *Costaticella*, a spinocystal genus, but by the early Eocene in the Indian Ocean, *Catenicella*, with an advanced morphology, is already present (LABRACHERIE & SIGAL, 1976, as *Vittaticella*).

Source : MNHN, Paris

The range of zooidal morphologies in the Catenicellidae led to the recognition of different groupings within the family. Accordingly, when BUSK (1852a) introduced the family, with two included genera, *Catenicella* and *Calpidium*, he recognised three groupings within *Catenicella* - fenestratae, vittatae, and inermes, but not as formal taxa. He continued to use these groupings (BUSK, 1852b, 1884), only changing 'inermes' to 'simplices' in the former work but abandoning the family name in the latter. In subsequent decades various authors recogised several new genera within BUSK's groupings. STACH (1933, 1934, 1935a) was the first to recognise subfamilies within the Catenicellidae, basing them primarily on the position of the ovicell within the segment. He named five subfamilies - Vittaticellinae (STACH, 1933), Scuticellinae (STACH, 1934), and Catenicellinae, Cornuticellinae, and Ditaxiporinae (STACH, 1935a). The distinction between the Vittaticellinae and Catenicellinae was artificial and based on a misunderstanding, since *Vittaticella* is a junior synonym of *Catenicella* (GORDON, 1984), and work by WASS & BANTA (1981) on catenicellid ovicell complexes has shown that the cornuticelline grouping may also be included in the Catenicellinae. Thus BANTA & WASS (1979) and WASS & BANTA (1981) accepted the distinction between the Catenicellinae, in which the ovicelled segment does not comprise the terminal segment of a branch, and the Scuticellinae, in which it does.

The remaining subfamily, Ditaxiporinae, was segregated primarily on the basis of the characteristic biseriate multizooidal segments, found in the fossil genera *Ditaxipora* MacGillivray, 1895, and *Ditaxiporina* Stach, 1935a. The chief features cited by STACH (1935a) as distinguishing these two genera were the longitudinal band on the frontal area in the former and the evenly porous shield lacking a band in the latter. STACH (1935b) noted the occurrence of multizooidal forms in the European and North American Paleogene. Because these were then the oldest-known catenicellids, he regarded them as archaic. [In the event, as mentioned above, the earliest-known catenicellid, from the Maastrichtian (mentioned above), resembles *Costaticella*, which makes the Scuticellinae the earliest-occurring subfamily.] CHEETHAM (1963) discussed the differences between *Ditaxipora* and *Ditaxiporina*, concluding that the evenly porous frontal shield and other (minor) features of the latter must preclude a close relationship. He therefore established a new family, Ditaxiporinidae, for *Ditaxiporina* and *Caberoides* Canu, 1908 (CHEETHAM, 1963). Notwithstanding having segregated the Ditaxiporinidae, he nevertheless concluded "Future investigations will probably verify the proximity of this family to the basal stock from which the Vittaticellidae [i.e., Catenicellidae] have sprung. ... However, the Vittaticellid roots should be sought amongst the archaic groups of Cheilostomata in Lower and Middle Eocene beds, not the more specialized forms of the Upper Eocene and Oligocene" (CHEETHAM, 1963 : 489). However, at that time, pre-Miocene scuticellines and catenicellines had not yet been discovered.

Thus, by 1966, only the three biseriate-multizooidal genera, *Ditaxipora*, *Ditaxiporina*, and *Caberoides*, segregated in two families, had been recognised. Subsequently, the discovery of a new species of *Plagiopora* MacGillivray at 831 m depth northwest of Norfolk Island (GORDON, 1989a) indicated that this multizooidal genus ought also to be included in the Ditaxiporinae. Previously known only from a single Middle Miocene species, this genus had been included by MACGILLIVRAY (1895) in the now-abandoned (and unrelated) family Lepraliidae.

The recognition of a new, living, genus of Ditaxiporinae in the MUSORSTOM samples from the northern Norfolk Ridge, plus the discovery of new ditaxiporine species in the New Zealand Eocene, prompted a reconsideration of all the multizooidal genera, especially based on scanning-electron-microscopic examination of type species.

LIST OF STATIONS

New Caledonia.

BIOCAL : station DW 70, 4.9.85, 23°24.70' S, 167°53.65' E, 965 m : *Bryosartor sutilis* (+ *Bifaxaria modesta*, *Diplonotos serratus*, *Petalostegus scopulus*).

MUSORSTOM 4 : station CP 214, 28.9.85, 22°53.80' S, 167°13.9' E, 425-440 m : *Bryosartor sutilis*.

BIOGEOCAL : station DW 313, 2.5.87, 20°58.95' S, 166°59.04' E, 1640-1600 m : *Bryosartor sutilis* (+ *Bifaxaria menorah*).

Source : MNHN, Paris

FIG. 1 a-f. — *Bryosartor sutilis* gen. et sp. nov. : **a**, arrangement of zooids in the multizooidal segment (x 42) ; **b**, ♀ zooid with ovicell (x 73) ; **c**, autozooid, showing the narrow costal field (x 144) ; **d**, proximal zooids of a young segment (x 86) ; **e**, dorsal view of a developing segment (x 58) ; **f**, interior view of costae from one side of a costal field and the irregular suture-line at their tips (x 305). (All from BIOCAL Stn DW 70.)

Source : MNHN, Paris

SYSTEMATIC ACCOUNT

Suborder ASCOPHORINA Levinsen, 1909

Infraorder CRIBRIOMORPHA Harmer, 1926

Superfamily CATENICELLOIDEA Busk, 1852a

Family CATENICELLIDAE Busk, 1852a

Subfamily DITAXIPORINAE Stach, 1935a

Genus *BRYOSARTOR* nov.

DIAGNOSIS. — Multizooidal, biseriate. Frontal shield includes a narrow costal field with several pairs of vestigial costae and a few extracostal windows; the adjacent gymnocysl with large shallow pore-chambers, 1 axial (1-2 on female zooids), 2 marginal. and another distal to the outer avicularium. Only a single avicularium on autozooids, at the outer distolateral corner; paired avicularia in female zooids. Ovicell large, with a large exposure of granular endooecium surrounded by smooth ectooecium. Dorsal zooidal surface smoolh, lacking pore-chambers.

RANGE. — Holocene.

TYPE SPECIES. — *Bryosartor sutilis* sp. nov.

Bryosartor sutilis sp. nov.

Fig. 1 a-f

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 70, 965 m.
MUSORSTOM 4 : stn CP 214, 425-440 m.
BIOGEOCAL : stn DW 313, 1640-1600 m.

DESCRIPTION. — Colony erecl, branching, to 31 mm high. the branches biserial wilh 4-6 zooids per fully formed segment; maximum segmenl length 4.74 mm and width 0.66 mm. All joints are single - at bifurcations the 2 distal zooids are angled away from each other, producing widely separated branches, and there is only a single zooid at the proximal end of each segment, which buds 2 daughter zooids to generate biseriality. Zooids vary in length according to position in segment - the shortest zooids (~0.34 mm) occur at the proximal end, the longest zooids (~0.64 mm) occur immediately distal to female zooids; zooidal width ~0.34 mm. The frontal side of each zooid has several components - centrally, there is a narrow, adaxially curving, costal field of about 11-19 short flattened spines with a median suture running through the field lo the orifice; the distalmost costae are very broad; outside the costal field are 3-4 gymnocystal foramina. Pore-chambers are large and shallow, with 1 on the axial side and 3 on the outer, marginal, side of each zooid - the axial one is the largest, extending from just dislolateral lo the orifice, past an avicularium (if there is one on thal side), to a position adjacent lo the middle of the costal field; laterally, there is a chamber behind the outer dislolateral avicularium and two larger chambers proximal to the avicularium. Zooidal orifice proportionately large, suboval, with a pair of tiny condyles aboul one-third the distance from the proximal rim. Avicularia 1-2, 1 at the outer distolateral corner of every zooid, wilh complete cross-bar and acute rostrum; a similar, less-acute, avicularium occurs opposite, adjacent to the distalmost costae, in ovicelled zooids and occasionally in other zooids. Ovicell large, about the size of the maternal zooid, occupying the complete frontal surface of the distal zooid, the ovicellular surface mostly granular endooecium wilh 'flaps' of smooth ectooecium distally and proximally; the orifice of fertile zooids generally a little longer than other orifices. Dorsal surface of branch segmenl with grooves marking the boundaries belween zooids, especially along the axis,

Source : MNHN, Paris

otherwise fairly smooth with no ridges. Colony anchored to substratum by a number of rhizoids descending the proximal parts of the colony; rhizoids issue from the proximal parts of zooids dorsally. Ancestrula small, 0.32 mm long and 0.23 mm wide including the distolateral corners; resembling later zooids but the proximal half evenly narrow and claviform, supported by a rhizoid issuing from the proximal end. The postancestrular and some later segments unizooidal.

TYPES. — *Holotype* : a colony from BIOCAL Stn DW 70, 965 m, MNHN-Bry 19934.

Paratypes : fragments of mature colonies from the same station, and young attached colonies from BIOGEOCAL Stn DW 313, 1640-1600 m, MNHN-Bry 19933.

ETYMOLOGY. — The genus name is partly derived from *sartor* (Latin), a tailor, and the species name from *sutilis* (Latin), sewed together. Both names allude to the narrow costal field which gives the zooidal frontal shield a stitched appearance.

DISTRIBUTION. — Southern New Caledonia and northern Norfolk Ridge, 425-1640 m.

REMARKS. — *Bryosartor* differs from *Ditaxiporina* in several important characters, including the presence of costae and extra-costal foramina, the number and disposition of frontal pore-chambers, and the complete lack of dorsal pore-chambers. At present, *Bryosartor* is monospecific.

Genus *CABEROIDES* Canu, 1908

DIAGNOSIS. — Multizooidal, biseriate. Frontal shield with a tiny suboral costal field with a few vestigial costae; no extracostal windows; adjacent gymnocyst with large shallow pore-chambers - 1-2 axially and 1-2 laterally, with another behind the outer lateral avicularium. Avicularia single or paired. Ovicell large, with a narrow exposure of endooecium surrounded by a large area of smooth ectooecium. Dorsal zooidal surface with at least 2 pore-chambers, with one or both narrow and curved.

RANGE. — Thanetian (Upper Paleocene) to Priabonian (Upper Eocene).

TYPE SPECIES. — *Caberoides canaliculata* Canu, 1908.

CONGENERIC SPECIES. — Four other species may be included in the genus. These are :

Catenicella continua Waters, 1891 = *Caberoides continua* (Waters, 1891) comb. nov., Priabonian, northeast Italy.

Caberoides grignonensis Canu, 1908, Lutetian, near Paris, France.

Vitaticellid [*sic*], n. gen. Cheetham & Håkansson, 1972 = *Caberoides rockallensis* sp. nov., Thanetian, Rockall Plateau, Northeast Atlantic.

Caberoides miranda sp. nov., Ypresian, Chatham Island, New Zealand.

Caberoides canaliculata Canu, 1908

Fig. 2 a-d

Caberoides canaliculata Canu, 1908 : 88, pl. 11 [84, pl. 8], figs 11-12. — BASSLER, 1953 : G212, fig. 159.4. — CHEETHAM, 1966 : 81.

MATERIAL EXAMINED. — **France.** Muséum national d'Histoire naturelle : Holotype specimen R.53409, Institut de Paléontologie, CANU Collection, Orglandes, near Paris, Lutetian.

Source : MNHN, Paris

DESCRIPTION. — Segments up to 2.26 mm long and 0.97 mm wide, with up to 12 zooids per segment. Zooids alternating, 0.29-0.38 mm long and 0.31-0.39 mm wide. Frontal shield with a central Y-shaped gymnocystal area flanked by pore-chambers, with a small costal field between the arms of the Y. The pore-chamber on the axial side extends from near the distolateral corner of the orifice to the proximal third of the zooid; the marginal pore-chamber extends from the lateral avicularium to the same level; more proximally is a very narrow pore-chamber that extends partly onto the dorsal surface. This arrangement is apparent in non-ovicelled zooids (at the proximal end in fertile segments). Orifice with a broad shallow poster. Avicularia single, on the lateral margin facing laterally, or double, as in ovicelled zooids. The axial avicularia occur in a series along the

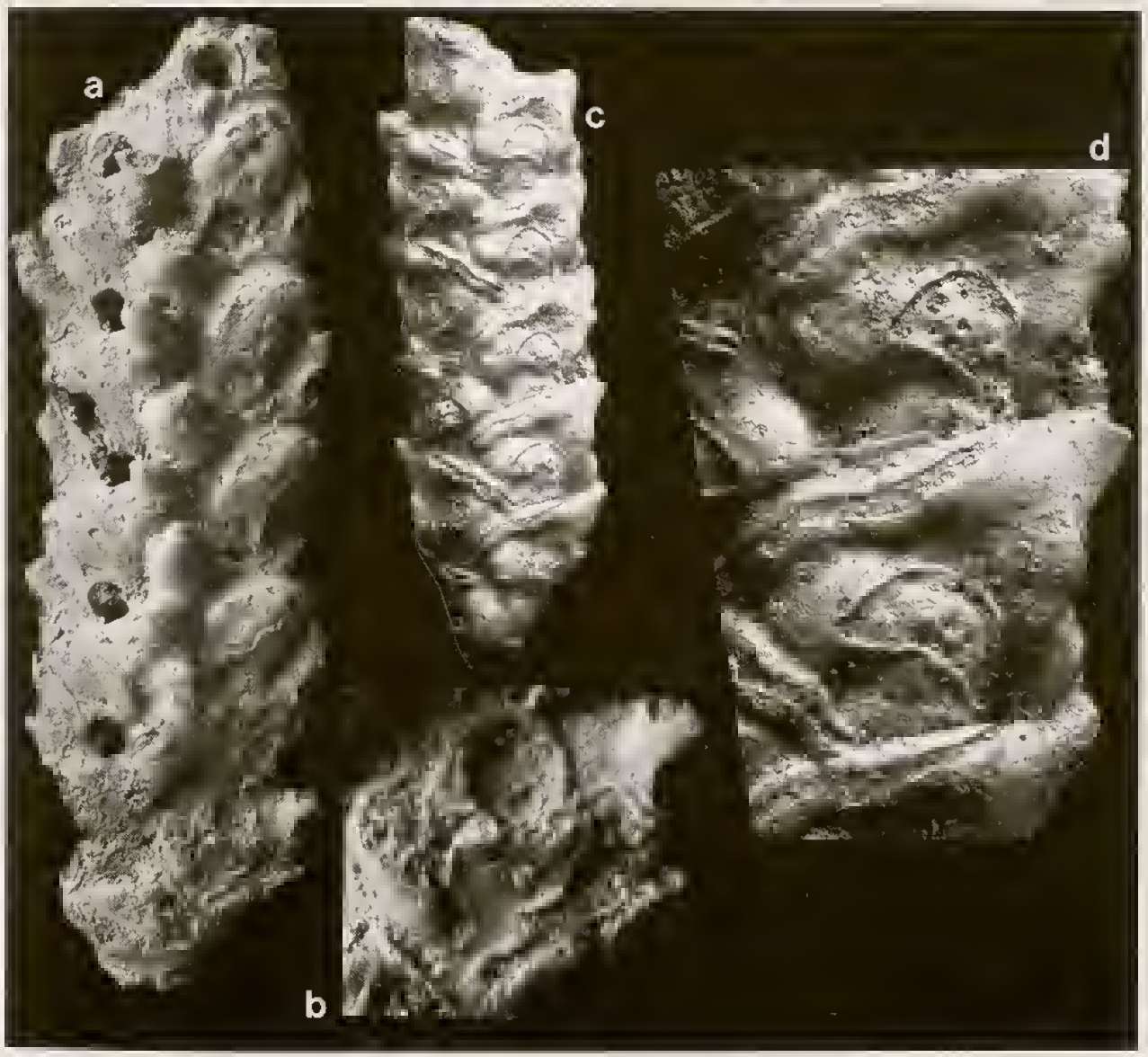

FIG. 2 a-d. — *Caberoides canaliculata* Canu : a, fertile segment with numerous ovicells (x 62) ; **b**, enlargement of the bottom right zooid in fig. a, showing the expanded lateral pore-chambers flanking the Y-shaped gymnocyst with small costal field (x 142) ; **c**, dorsal face of a segment, showing the disposition of pore-chambers (x 42) ; **d**, part of fig. c, magnified (x 119). [SEMs of CANU's uncoated figured specimens from Orglandes (CANU, 1908, pl. 8 (pl. 11), figs 11-12), slide R53409, Institut de Paléontologie, Muséum national d'Histoire naturelle.]

Source : MNHN, Paris

centre of the segment, with each obliquely facing the zooid which bears it; both axial and lateral avicularia with semicircular opesiae, complete cross-bars, and acute triangular rostra; frequently the lateral avicularium is projected beyond the rostrum. Ovicell relatively large, obliquely recumbent over much of the frontal shield of the zooid distal to it; the ectooecium smooth with a narrow axial fenestra (widening proximally) and possibly a few scattered pores. Dorsal surface of segment with a distinctive arrangement of pore-chambers - a long and narrow, vibraculum-like, chamber extends from behind each lateral avicularium obliquely down and across the zooidal surface beyond the midline of the segment; thus the oblique pore-chambers on one side of the segment overlap with those on the other side. A somewhat semicircular pore-chamber, with several scattered septular pores, occurs in the centre of the dorsal wall of each zooid.

DISTRIBUTION. — Middle Lutetian (Middle Eocene), near Paris.

REMARKS. — CANU (1908) had some difficulty in interpreting this genus, not being intimately acquainted with the southern hemisphere catenicellids. He called the axial row of avicularia vibracula, presumably akin to those in the branch axils of *Scrupocellaria*, and referred to the oblique dorsal pore-chambers (like catenicellid 'vittae') as "a system of gutters containing vibracular bristles" [our translation]. Nevertheless, he recognized the obvious ascophorine nature of the genus and, while not then suggesting a family for his new genus, CANU & BASSLER (1929) later suggested the Reteporidae. CHEETHAM (1963) recognized the catenicellid affinities of *Caberoides* and *Ditaxiporina*, meanwhile establishing a new family, Ditaxiporinidae, for these two genera. Later, CHEETHAM (1966) described an apparent new species of *Caberoides* (*C. cornuculatus*) from the Bartonian (upper Middle Eocene) of Sussex, England. We have examined this species by scanning electron microscopy and conclude that it is not congeneric with *Caberoides* — later in this paper, we introduce a new genus for it (*Ahcheethamia*).

Caberoides grignonensis Canu, 1908 (fig. 3 a-b) is very similar to *C. canaliculata*, differing in details of the costal field and dorsal surface and in its longer and narrower segments. Another species that may be included in *Caberoides* is *Catenicella continua* Waters, 1891 (fig. 3 c-f) from the Priabonian (late Eocene) of northeast Italy (BRAGA & BARBIN, 1988, as *Vittaticella*). WATERS's (1891) attribution of this species to *Catenicella* was based primarily on the presence of conspicuous lateral pore-chambers (vittae), like those of *Catenicella* but larger. When MACGILLIVRAY (1895) established his new genus *Ditaxipora*, he implied that *C. continua* might be included in it but this idea was not followed by later authors (e.g., WATERS, 1913; CANU & BASSLER, 1917, 1920) until the work of STACH (1935a, b), who first used the combination *Ditaxipora continua*. This is surprising, especially in the case of WATERS (1913 : 483), who allied the species with *D. internodia* when he first described *continua* (WATERS, 1891). In the event, *C. continua* must be excluded from *Ditaxipora* which lacks any trace of a costal shield and in which the dorsal surface of each zooid is mostly composed of a single large pore-chamber. On the other hand, *C. continua* shares the important characters of *Caberoides miranda* and *C. rockallensis* (see below), viz, a small costal field flanked by pore-chambers, laterally facing avicularia, and a vibraculum-like dorsal pore-chamber and may be included in the genus as a new combination, *Caberoides continua*. It is interesting that *C. continua*, occurring later in the Paleogene (Priabonian) than the other species (Thanetian to Lutetian), has much longer frontolateral pore-chambers that anticipate those in *Ditaxipora*, which may have been derived from *Caberoides*. It is to be noted that, whereas the supraavicularian pore-chamber is long and vibraculum-like in most of the species, it is the proximolateral one in *C. continua* that has this form. When more species become known it may be appropriate to divide *Caberoides* into subgenera on the basis of this character.

FIG. 3 a-b. — *Caberoides grignonensis* Canu : **a**, fertile segment with numerous ovicells (x 39) ; **b**, part of fig. a showing the distalmost ovicells. Note the small costal field in the upper left-hand zooid (x 120). (SEM of CANU's uncoated figured specimen from Grignon [CANU, 1908, pl. 8 (pl. 11), fig. 15), slide R53358, Institut de Paléontologie, Muséum national d'Histoire naturelle.]

FIG. 3 c-f. — *Caberoides continua* (Waters) : **c**, **e**, autozooidal frontal shields showing the arrangement of pore-chambers, median gymnocyst, and small costal field (x 209 ; x 360) ; **d**, **f**, dorsal surface of segment and zooids, showing disposition of pore-chambers (x 47 ; x 128). (From Monteccio di Costozza, Italy, late Eocene ; BRAGA Collection, Dipartimento di Geologia, Paleontologia e Geofisica dell'Università di Padova.).

Source : MNHN, Paris

Source : MNHN, Paris

Caberoides miranda sp. nov.

Fig. 4 a-d

MATERIAL EXAMINED. — **New Zealand.** From New Zealand Geological Survey (NZGS) collection GS 14765 from the Malanginui Limestone, Ypresian (Lower Eocene), 50 m north of the mouth of Waipapa Creek, Chatham Island (locality CH/f603), collected by H.J. CAMPBELL and P.A. MAXWELL, March 1981; three other poorly preserved non-type specimens in a separate well on the same slide.

DESCRIPTION. — Segments incomplete in the present material, the largest attaining 1.20 mm long and 0.43 mm wide, comprising parts of 8 zooids. Zooids small, 0.33-0.43 mm long and ~ 0.25 mm wide, widest in the distal half, sometimes tapering narrowly in the proximal half, the median line between zooids tracing an irregular zigzag course along each segment. Zooidal orifice with a pair of small rounded condyles separating a broad anter from smaller poster - the exact shape of the latter is uncertain owing to poor preservation. The frontal area of each zooid comprises 3 components - gymnocystal and cryptocystal (of approximately equal area) and spinocystal. The spinocyst comprises a small suboral field of ~6 tapering costae whose acute tips probably did not fuse in life. Part, at least, of the proximal rim of the orificial sinus was defined by costal elements. Four cryptocystal areas, occasionally 5, representing pore-chambers, occur frontally. The largest, with up to 7 septular pores evident, occurs on the axial side of the orifice and costal field. In 1 or 2 zooids in a segment this pore-chamber is shortened by the occurrence of an avicularium beside the orifice. More typically, avicularia are restricted to the zooidal margin, where 1 occurs facing laterally; it has a semicircular opesia, complete cross-bar, and triangular rostrum with no palate. Distal to this avicularium is a second pore-chamber (with ~2-3 pores) which curves obliquely round and down the dorsal surface. Immediately proximal to the avicularium, and partly overhung by it, is a third pore-chamber (with ~5 pores), which also curves round onto the dorsal surface. Near the proximolateral margin is a fourth frontal pore-chamber (with ~5 pores), of which the larger part curves obliquely upwards onto the dorsal surface towards the proximal end of the supraavicularian pore-chamber. Occasionally, a small rounded fifth pore-chamber (with 3 pores) is interpolated between the subavicularian and proximolateral chambers. Dorsally, the median boundary between zooids describes a series of curving zigzags along the segment. Of the 3 pore-chamber areas that occur on the dorsal side of each zooid, the downcurving supraavicularian one is notable for its superficial resemblance to a vibracular groove. Ovicell unknown.

TYPE. — *Holotype* : the segment illustrated in figure 4 a-d, from the Malanginui Limestone (Lower Eocene), Waipapa Creek, Chatham Island, type number BZ 161, in the collection of the Institute of Geological & Nuclear Sciences, Lower Hutt, New Zealand.

DISTRIBUTION. — Ypresian (Lower Eocene), Chatham Island, New Zealand.

ETYMOLOGY. — The specific name is a Latin adjective meaning wonderful, strange, singular.

REMARKS. — The Matanginui Limestone is a white, massive, bryozoan-echinoid-foraminiferan-bivalve packstone (WOOD *et al.* 1989). On Chatham Island it is up to 25 m thick and commonly soft. The occurrence of the foraminiferan *Asterocyclina* in the lower part of the limestone on Chatham Island indicates deposition in a shallow warm sea within the photic zone. The scarcity of shallow-water foraminifers in the middle and upper parts of the limestone indicate middle- to outer-shelf depths, the likely provenance of *C. miranda*. The bryozoan diversity in this limestone is extraordinarily rich, with abundant representation of erect branching, bilamellar, articulated, and rod-like forms, indicative of relatively fast, nutrient-rich currents.

FIG. 4 a-d. — *Caberoides miranda* sp. nov. : **a-c**, SEMs of best-preserved specimen, showing disposition of frontal pore-chambers, gymnocyst, and costal field in relation to the orifice and distolateral avicularium (x 114 ; x 285 ; x 211) ; **d**, same, dorsal view (x 120). (Holotype specimen, in collection of NZGS, Lower Hutt, from the Malanginui Limestone, Chatham Island, New Zealand, Lower Eocene.)

FIG. 4 e. — *Caberoides rockallensis* sp. nov., SEM of uncoated specimen (x 106). USNM specimen 172444 from Deep Sea Drilling Site 117A, Rockall Plateau, North Atlantic.

Source : MNHN, Paris

Source : MNHN, Paris

It is obvious from the light-micrograph illustrations of the frontal and dorsal sides of the late Paleocene "Vitaticellid [*sic*], n. gen." of CHEETHAM and HÅKANSSON (1972) that this species is very similar to *C. miranda*. Their two specimens, one comprising two zooids (illustrated in dorsal view) and the other comprising four zooids (illustrated in frontal view) have many features in common - namely the small costal field flanked by pore-chambers, a laterally facing avicularium, a proximolateral pore-chamber curving round dorsally, and an identical disposition of pore-chambers dorsally including the vibraculum-like chamber that originates distal to the avicularium. Their species differs only in details, including the proportionately larger avicularium and wider rims of the pore-chambers. We hereby name the species represented by their specimens *Caberoides rockallensis* sp. nov. We designate the larger of the two specimens (USNM slide 172444) (fig. 4, e) as *holotype*, the smaller (slide 172445) as *paratype*. Both specimens are held in the collection of the Smithsonian Institution (National Museum of Natural History), Washington, D.C.

Caberoides rockallensis was taken at Deep Sea Drilling Site 117A on the Rockall Plateau (57°20.17' N, 15°23.97' W, 1038 m) in the North Atlantic Ocean. On the basis of certain other taxa in the assemblage, CHEETHAM and HÅKANSSON estimated that the depth, in life, of the assemblage was not more than 60 m.

Genus ***DITAXIPORA*** MacGillivray, 1895

DIAGNOSIS. — Multizooidal, biseriate. Frontal shield lacking any trace of costae; comprising a T-shaped median gymnocystal ridge flanked on either side by a wide pore-chamber with conspicuous septular pores in a single longitudinal series. An additional, small, pore-chamber occurs distal to the avicularium; a similar pore-chamber on the opposite side of the orifice may be confluent with the lateral pore-chamber. Avicularia single in autozooids, 1-2 in ovicelled zooids. Ovicell large, with an extensive area of endooecium exposed frontally. Dorsal surface with a single large pore-chamber per zooid.

RANGE. — Lutetian (lower Middle Eocene) to ?Messinian (uppermost Miocene).

TYPE SPECIES. — *Catenicella internodia* Waters, 1881.

CONGENERIC SPECIES. — Three other species may be included in this genus. These are :
Bactridium labiatum Canu, 1910, Bartonian, Biarritz, southwest France.
Ditaxipora luteciana Canu, 1913, Lutetian, near Bordeaux, Southwest France.
Ditaxipora pannonensis Braga *in* Antolini *et al.*, 1980, Priabonian, northeast Italy.

Ditaxipora internodia (Waters, 1881)

Fig. 5 a-c

Catenicella internodia Waters, 1881 : 318, pt. 18, figs 78-79. — WATERS, 1883 : 430.
Ditaxipora internodia - MACGILLIVRAY, 1895 : 22, pl. 2, fig. 3i, 3ta. — MAPLESTONE, 1898 : 21; 1904 : t9t. — STACH, 1935a : 394; 1935b : 40, figs 2-3. — BASSLER, 1953 : G222, fig. 167, 6 a-b. — BROWN, 1958 : 82. — WASS, 1973 : 9.
Strophipora (Ditaxipora) internodia - CANU & BASSLER, 1929 : 452, fig. t85 F-G.

MATERIAL EXAMINED. — **Australia**. Royat Melbourne Institute of Technology : specimens of *Ditaxipora internodia* from Princetown (#507) and Fyansford (#514), Miocene, Victoria, collected by P.E. BOCK.

DESCRIPTION. — Segments up to 2.34 mm long and 0.47 mm wide, comprising up to 10 regularly alternating zooids; this alternation tends to be maintained even in the most proximal zooids of a segment. Paired joint-holes at the distal end of a segment imply branch bifurcations. Zooids 0.47-0.55 x 0.22-0.28 mm, near-rectangular with parallel sides or evenly tapering somewhat towards the proximal end. Orifice a little longer than wide, with a pair of condyles which separate the broad rounded poster from the anter. Frontal shield with 2 large cryptocystal areas

Source : MNHN, Paris

(pore-chambers), each with a linear row of septular pores along its length, separated by a T-shaped median gymnocystal ridge. This ridge is composed of 2 longitudinal components with a median suture-line between that runs into the cross-piece of the T. The lateral pore-chambers may curve narrowly round to the distal side of the orifice or, more usually, they terminate adjacent to the orifice, especially at the avicularium, leaving the small distal chambers isolated. A single avicularium per zooid, always on the outer (marginal) side of the orifice, with a semicircular opesia, complete cross-bar, and acute triangular rostrum. Ovicell large, similar to that in *Bryosutor sutilis*, with a granular endooecium bordered by smooth ectooecium, two 'flaps' of which encroach toward the centre of the granular area. Dorsal surface with a sinuous median interzooidal groove and a single large pore-chamber per zooid, each with linear septular pores.

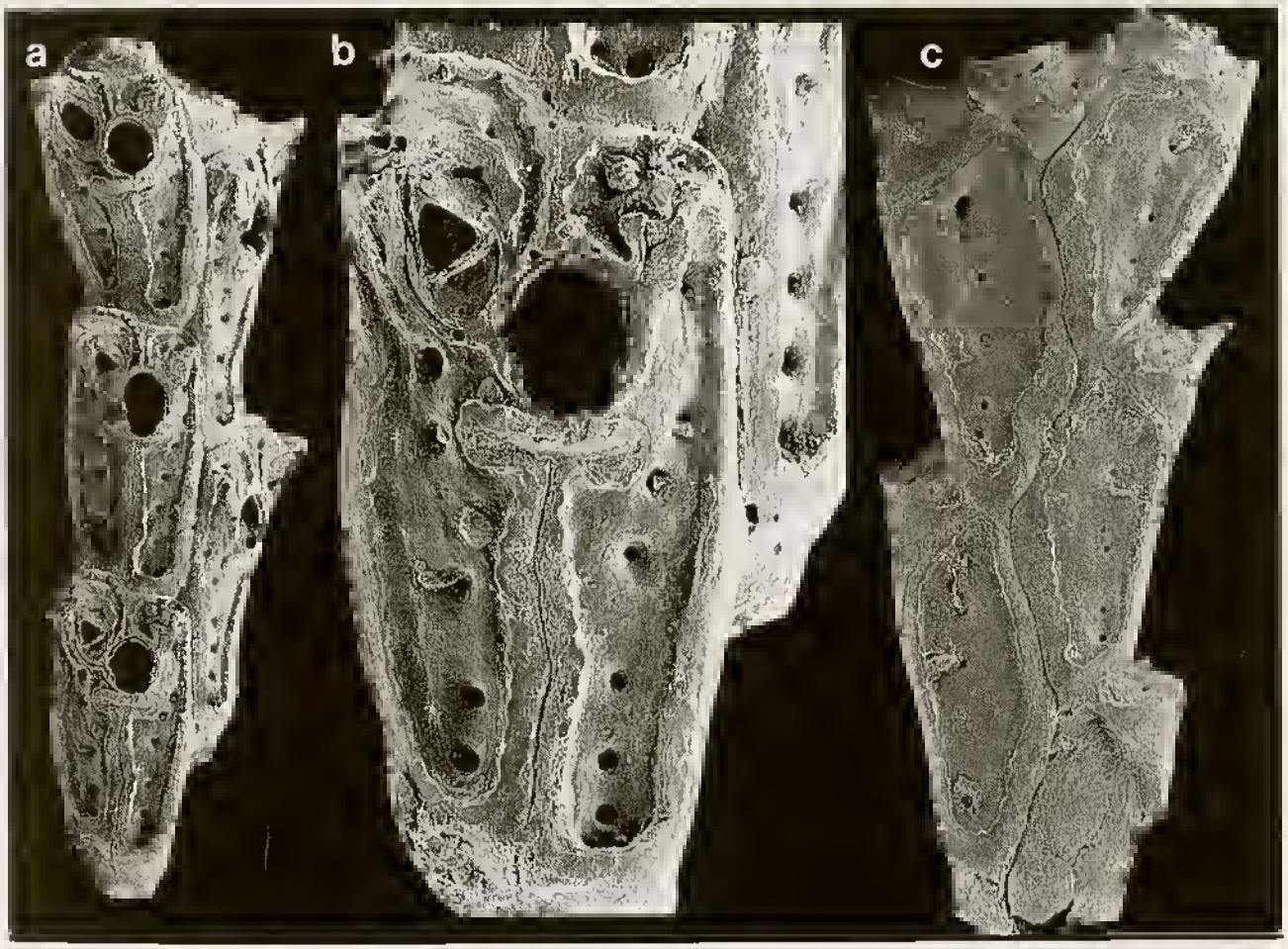

FIG. 5 a-c. — *Ditaxipora internodia* (Waters) ; **a-b**, frontal views of zooids (x 65 ; x 185) ; **c**, dorsal surface of segment showing large pore-chambers (x 104). (From Princetown, Victoria, Miocene ; Bock Collection, Royal Melbourne Institute of Technology.)

DISTRIBUTION. — Victoria, Australia. Early Oligocene to Late Miocene.

REMARKS. — On the basis of the localities cited for this species by WATERS (1881, 1883), MACGILLIVRAY (1895), MAPLESTONE (1904), STACH (1935b), and BROWN (1958), and the stratigraphic work of COCKBAIN (1971), WASS (1973) gave the range of *Ditaxipora internodia* as Early Oligocene (Rupelian) to Late Miocene (?Tortonian/Messinian).

Both WATERS (1881) and MAPLESTONE (1898) noted the occurrence of a foramen in the middle of the gymnocystal ridge and depicted the cross-piece of the T as more oval, features not apparent in the material

Source : MNHN, Paris

described by MACGILLIVRAY (1895). MAPLESTONE (1898) and STACH (1935b) concluded that this variation is intraspecific. One of the segments in the material kindly donated to us by Phil BOCK (Royal Melbourne Institute of Technology) does have the median foramen in several zooids. These foramina are predator boreholes. *Catenicella internodia* var. *angustata* Waters, 1883 merely represents older internodes of this species according to STACH (1935b).

Ditaxipora pannonensis Braga *in* Antolini *et al.*, 1980 (fig. 6 a-c) from the Priabonian (Upper Eocene) of northern Italy is clearly related. It has a similar T-shaped gymnocystal ridge frontally and large dorsal pore-chambers dorsally. The ovicell is also similar, with proportionately larger proximal ectooecial 'flaps'. *Ditaxipora labiata* (Canu, 1910) from the Bartonian of France is likewise congeneric - the characteristic frontal gymnocystal ridge and large dorsal pore-chambers are typical of *Ditaxipora*, not *Ditaxiporina*, as LABRACHERIE (1968) correctly pointed out.

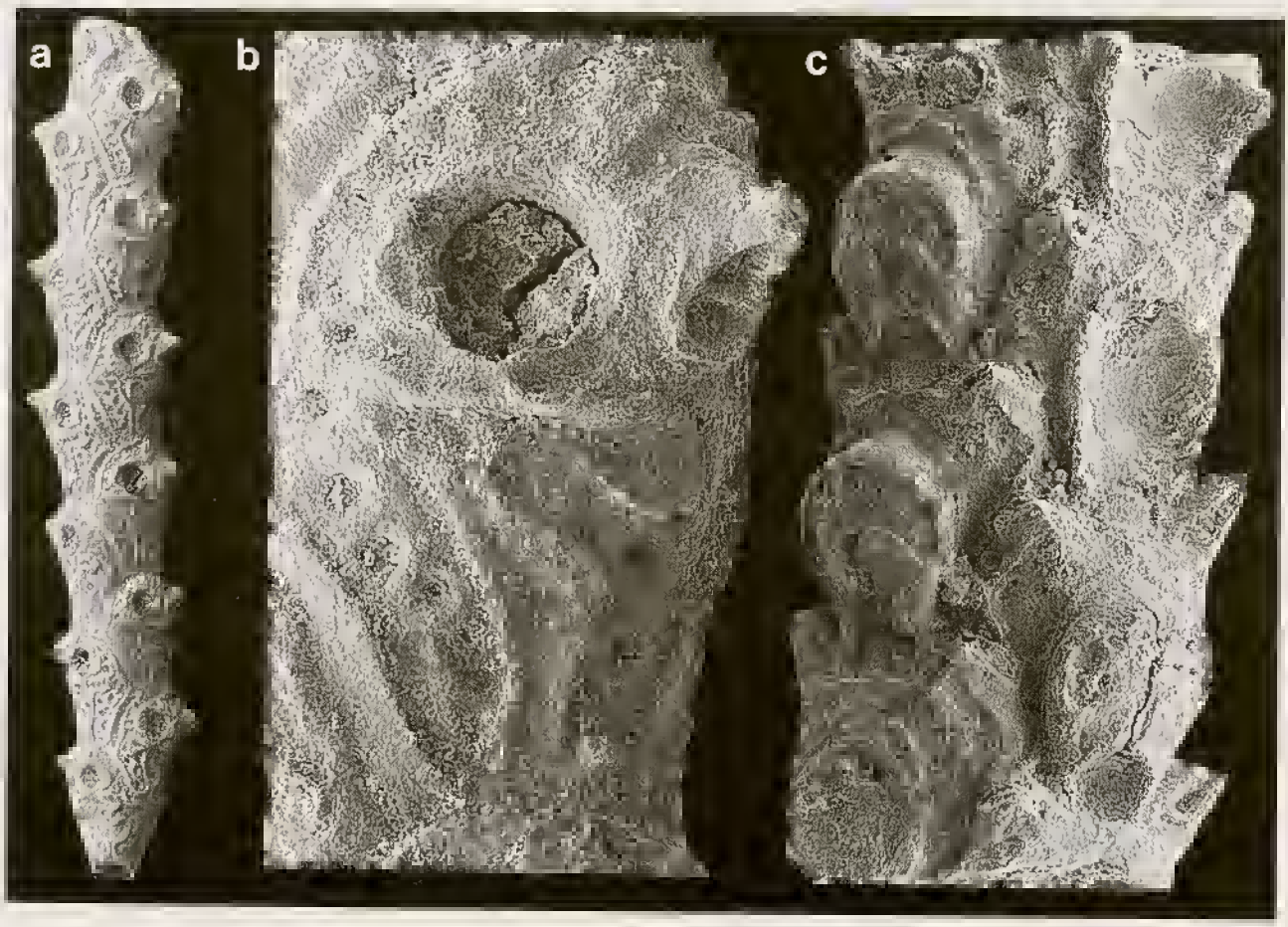

FIG. 6 a-c. — *Ditaxipora pannonensis* Braga *in* Antolini *et al.* : **a**, sterile segment (x 35) ; **b**, part of fig. a (x 216) ; **c**, ovicelled zooids (x 96). (From Pannone, late Eocene, Braga Collection, Dipartimento di Geologia, Paleontologia e Geofisica dell'Università di Padova.)

Genus *PLAGIOPORA* MacGillivray, 1895

DIAGNOSIS. — Multizooidal, biseriate. Zooidal orifice slightly asymmetrical and at an angle to the segmental axis. Frontal shield lacking costae; comprising an obliquely set narrow gymnocystal band suborally that separates several broad, shallow, pore-chambers (cryptocystal fields) tiny sparse septular pores; the gymnocystal band with

Source : MNHN, Paris

or without foramina and a suture. An additional 1-2 smaller pore-chambers distolateral to the orifice. Avicularia paired or single. Ovicell unknown. Dorsal surface with broad pore-chambers confluent with the laterofrontal chambers.

RANGE. — Priabonian (Upper Eocene) to present day.

TYPE SPECIES. — *Plagiopora disticha* MacGillivray, 1895.

CONGENERIC SPECIES. — Two other species may be included in the genus. These are :
Plagiopora recens Gordon, 1989a, Holocene, near Norfolk Island, southwest Pacific.
Plagiopora alma sp. nov., Priabonian, Alma, near Oamaru, New Zealand.

Plagiopora disticha MacGillivray, 1895

Fig. 7 a-c

Plagiopora disticha MacGillivray, 1895 : 79, pl. 13, fig. 14 a-c. — MAPLESTONE, 1904 : 206. — BASSLER, 1953 : G212, fig. 160, 3 a-b. — GORDON 1989a : 1330.

MATERIAL EXAMINED. — **Australia.** Museum of Victoria : holotype slide P27769, from Muddy Creek, Victoria, Middle Miocene (single internode on slide subsequently inadvertently lost by DPG). Royal Melbourne Institute of Technology : slides of specimens from Princetown and Balcombe Bay, Victoria, Middle Miocene, collected by P.E. BOCK.

DESCRIPTION. — Segments up to 2.70 mm long and 0.47-0.72 mm wide (depending on avicularian projections) with up to 10 zooids per segment. Zooids 0.43-0.49 mm long and 0.37-0.45 mm wide (again, varying according to avicularian length), alternating along the segment with a zigzag interzooidal boundary axially. Frontal shield comprising large shallow cryptocystal areas (pore-chambers) separated by thin gymnocystal strips. The pore-chambers are arranged such that, when seen in frontal view, each zooid has 2 (supraavicularian and lateral-oral) on its inner, axial side (only 1 if there is no avicularium separating them), and 3 (supraavicularian, lateral-oral, proximolateral) on its outer, marginal side. The 2 inner ones have a single septular pore; the 3 outer ones have 2 to several pores clustered on or near the zooidal margin. The thin gymnocystal ridges separating, and surrounding, the pore-chambers are continuous. The ridge between the inner lateral-oral and outer proximolateral pore-chambers is widest and somewhat Y-shaped, with 6-7 small foramina distributed along the arms and tail of the Y; the longer arm that courses obliquely from the orifice to the branch axis has a longitudinal suture flanked by apparent vestigial costal elements, but the extent of their development varies considerably from zooid to zooid. Orifice longer than wide, orientated obliquely on the zooid. Avicularia usually paired, occasionally single, with complete cross-bar and acute triangular rostrum; facing laterally, the avicularian process short or considerably projecting. Ovicell unknown. Dorsal surface comprising a pair of large pore-chambers per zooid which are continuous with the outer lateral-oral and proximolateral ones on the frontal side; a few tiny septular pores occur near the lateral margin in each chamber. Axial interzooidal boundary sinuous dorsally, not zigzag.

DISTRIBUTION. — Victoria, Australia, Early Oligocene to Middle Miocene (Rupelian to ?Langhian/Serravallian).

REMARKS. — This species has been little reported on. According to the localities given by MAPLESTONE (1904) and COCKBAIN's (1971) corrected ages given by WASS (1973), this species is distributed from Early Oligocene to Middle Miocene. The range of the genus in time, however, was extended to the present day when GORDON (1989a) discovered in N.Z. Oceanographic Institute samples a new species, *P. recens* (fig. 8 a–c), at 831 m depth on the western flank of the Norfolk Ridge north of Norfolk Island. Although this was the first living ditaxiporine species to be discovered, only isolated segments (still with membranes intact) were found, so it was of some interest to discover several mature and attached colonies of a second living ditaxiporine (*Bryosutor sutilis* sp. nov.) in MUSORSTOM samples from the far northern part of the Norfolk Ridge. This biogeographic connection

Source : MNHN, Paris

between the Norfolk Ridge and the Tertiary of Victoria is paralleled by other catenicelloidean Bryozoa, viz, species of *Petalostegus* and *Chelidozoum* (GORDON & D'HONDT, 1991). Subsequently, an Upper Eocene species (*P. alma* sp. nov., see below) was discovered at Alma, South Island, New Zealand.

FIG. 7 a-e. — *Plagiopora disticha* MacGillivray : a, c, frontal views of segment and zooids (x 37 ; x 122) ; b, dorsal view of proximal end of a segment (x 65) ; d, e, magnified views of the median gymnocystal ridge and vestigial costal elements (x 388 ; x 683). (From Princetown, Victoria ; BOCK Collection, Royal Melbourne Institute of Technology.)

Source : MNHN, Paris

The finding of a suture and apparent vestigial costae in the median gymnocystal ridge in *Plagiopora disticha* (made possible by the remarkable preservation) is significant, for it indicates that *Plagiopora* was derived from a form with a costal field, a larger area of gymnocyst with extracostal windows, and smaller pore-chambers. *Plagiopora recens* is even more derived but may nevertheless be included in the genus in spite of no trace of vestigial costae. One significant difference in this species, however, is the occurrence of transverse gymnocystal ridges on the dorsal surface. *Plagiopora alma* also lacks any trace of costae or gymnocystal windows, although it is the earliest species of the genus. In frontal view, it more closely resembles *P. recens* than *P. disticha*. Dorsally, it is closer in appearance to *P. disticha* in lacking transverse gymnocystal ridges.

Plagiopora alma sp. nov.

Fig. 8 d–g

MATERIAL EXAMINED. — **New Zealand.** At Alma, north Otago, New Zealand, from the fine fraction in a calcareous conglomeratic tuff, Waiareka Volcanic Formation, Runangan age (= Priabonian, Upper Eocene); N.Z. Fossil Record File No. J41/f88, grid reference J41/453639, collected by D.P. GORDON, March 1993.

DESCRIPTION. — Unique segment 0.98 mm long and 0.32 mm wide, comprising 4 zooids. Zooids small, 0.39–0.45 mm long and ~ 0.16 mm wide, widest in the distal half, tapering narrowly in the proximal half if at the proximal end of the segment. Zooidal orifice somewhat pyriform and asymmetrical, slightly oblique, with the distal end a little closer to the segmental axis; proximal end with a sinus-like narrowing, with 1 or 2 condyles evident at the corners of the sinus. Frontal shield comprising shallow cryptocystal sectors (essentially broad flattened pore-chambers) separated by narrow gymnocystal ridges; these sectors include 1 on each side subjacent to the orifice and proximal to each lateral-oral avicularium (if there are 2), and a single large area over the proximal half of the zooid. There are 2 additional sectors distolateral to the orifice above each avicularium. Thus there are 3 such areas along every outer zooidal margin, each of which continues around the margin to the dorsal side. Septular pores are not evident in the cryptocystal sectors. Avicularia evidently generally paired, either side of the orifice, each with a complete cross-bar, the inner one facing frontally and directed obliquely towards the orifice, the outer one facing laterally and directed distally. Where the inner avicularium is lacking, as on the proximal zooid of a segment, the cryptocystal sectors adjacent to the orifice merge as one. Ovicell unknown. Dorsal side of segment with a sinuous median groove longitudinally paralleled by the gymnocystal margins adjacent to the cryptocystal sectors.

TYPE. — *Holotype* : the unique segment illustrated in figure 8 d–g, from the Waiareka Volcanic Formation, Alma, north Otago, New Zealand, type number BZ 162, Institute of Geological & Nuclear Sciences, Lower Hutt, New Zealand.

DISTRIBUTION. — Runangan (= Priabonian, Upper Eocene), Oamaru, South Island, New Zealand.

ETYMOLOGY. — The specific name is that of the type locality.

REMARKS. — The road cutting through the Waiareka Volcanic Formation has exposed a calcareous tuff packed with small stones, frequently encrusted by bryozoans, tubicolous polychaetes, and coralline algae. The fine fraction includes isolated segments of buguloidean and cellarioidean bryozoans, rare catenicellid fragments and, at one end of the exposure, the warm-water foraminiferan *Asterocyclina*. The overall setting appears to have been the shallow subtidal in well-oxygenated water of oceanic or near-oceanic salinity.

In its overall morphology, *Plagiopora alma* is somewhat intermediate between *P. disticha* and *P. recens*. Gymnocystal foramina are lacking in *P. alma*, as are vestigial costae, except that the proximal rim of the orificial sinus gives the appearance of being derived from a suboral pair. While the frontal side of the segment closely resembles that of *P. recens*, the dorsal side lacks transverse gymnocystal ridges. Although occurring earlier, *P. alma* is less derived in frontal-shield morphology than *P. disticha*.

Source : MNHN, Paris

Source : MNHN, Paris

Genus *AHCHEETHAMIA* nov.

DIAGNOSIS. — Multizooidal, biseriate. Frontal shield a porous gymnocyst. Proximal rim of orifice composed of a pair of vestigial costae. Avicularia single, borne laterally, ?or paired. Ovicell evenly porous like the frontal shield. Dorsal surface with numerous pores.

RANGE. — Bartonian (Middle Eocene).

ETYMOLOGY. — The genus is named after the author of the species, Dr Alan H. CHEETHAM (Smithsonian Institution) in recognition of his outstanding contributions to bryozoology.

TYPE SPECIES. — *Caberoides corniculatus* Cheetham, 1966.

Ahcheethamia corniculata (Cheetham, 1966)

Fig. 9 a-f

Caberoides corniculatus Cheetham, 1966 : 82, figs 60-61.

MATERIAL EXAMINED. — **England.** The Natural History Museum, London: Holotype specimen D48746, from the Upper Bracklesham Beds, Fisher Bed 21, Selsey, Sussex, England (National Grid Reference SZ 836936), collected by D. CURRY and presented November 1961; paratypes D48751, D48756, D48766, D48767, from same locality as holotype. Smithsonian Institution: 4 non-type specimens, from same locality as holotype.

DESCRIPTION. — Segments up to ~2.20 mm long and 0.68 mm wide, with up to 12 zooids per segment. Zooids 0.32-0.37 mm long and 0.26-0.37 mm wide, the gymnocystal frontal shield coarsely perforated by numerous pores. Orifice with a pair of small condyles; the concave proximal rim composed of a pair of broad vestigial costae. On the axial side of each orifice is an umbo, perforated like the frontal shield. On the outer, lateral, side of the orifice is a frontolaterally facing avicularium, the opesia semicircular, the cross-bar complete, the rostrum triangular; a process behind the rostrum may project beyond the avicularium. Ovicell recumbent, set obliquely to the segmental axis, perforated like the frontal shield. Dorsal surface of segment with a median zigzag suture line, the zooidal basal walls evenly perforated like the frontal shield.

DISTRIBUTION. — Lower Bartonian (Middle Eocene), Sussex, England.

REMARKS. — Our description of the species is based on SEM observations of uncoated specimens (most of which were generously provided by Dr Paul D. TAYLOR, The Natural History Museum, London). The perforations in the dorsal surface of each zooid are very curious. They do not appear to represent septular pores (no pore-chamber boundary is evident on the lateral margin); rather, they appear to be the same as the frontal gymnocystal pores, which is somewhat unusual.

Although *Ahcheethamia corniculata* segments resemble those of *Caberoides* in their general form, the species differs from the type and other species of *Caberoides* in having a porous frontal gymnocyst, only a suboral pair of vestigial costae, no frontal pore-chambers, and a perforated ovicell. The porous gymnocyst, in fact, invites comparison with that of *Ditaxiporina*.

The genus is at present monotypic.

FIG. 8 a-c. — *Plagiopora recens* Gordon : **a**, frontal view of a segment with seven zooids (x 39) ; **b**, dorsal view of a segment with six zooids (x 42) ; **c**, orifices and avicularia of two zooids (x 167). (From NZOI Stn G4, western flank of Norfolk Ridge north of Norfolk Island, 831 m depth).

FIG. 8 d-g. — *Plagiopora alma* sp. nov. : **d**, frontal view of the holotype segment (x 100) ; **e**, zooidal orifice (x 411) ; **f**, dorsal view of the holotype segment (x 100) ; **g**, close-up of frontal shield (x 217). (From Alma, North Otago, New Zealand, Priabonian, Institute of Geological & Nuclear Sciences, Lower Hutt.)

Source : MNHN, Paris

FIG. 9 a-f. — *Ahcheethamia corniculata* (Cheetham) : **a**, fertile segment with three ovicelled zooids (x 43) ; **b**, same, showing the three ovicells (x 95) ; **c**, another segment, showing the distolateral avicularia (x 95) ; **d**, **e**, dorsal surface (x 54 ; x 152) ; **f**, close-up of left-hand ovicelled orifice in fig. b (x 190). (Figs a-c, f, uncoated holotype D48746, BMNH, London ; d-e, uncoated paratype D48756, BMNH ; from the Upper Bracklesham Beds, Sussex.)

Source : MNHN, Paris

Genus *DITAXIPORINA* Stach, 1935a

DIAGNOSIS. — Multizooidal, biseriale. Frontal shield an evenly porous gymnocyst. Proximal rim of orifice composed of a vestigial pair of costae, each with a lumen pore (pelma). Between each costa and the paired distolateral avicularia is a tiny pore-chamber. Ovicell smooth, imperforate or with a pair of ectooecial fenestrae. Dorsal surface of zooids smooth; a tiny pore-chamber may occur subjacent to each avicularium.

RANGE. — Lutetian (lower Middle Eocene) to Rupelian (Lower Oligocene).

TYPE SPECIES. — *Catenicella septentrionalis* Waters, 1891.

Ditaxiporina septentrionalis (Waters, 1891)

Fig. 10 a-d, tt c-d

Catenicella septentrionalis Waters, 1891 : 5, pt. 1, figs 1-8. — BRAGA, 1963 : 41.
Ditaxiporina septentrionalis - STACH, 1935a : 395; 1935b : 46. — CHEETHAM, 1963 : 485. — BRAGA *in* ANTOLINI *et al.*, 1980 : 61, fig. 44. — BRAGA & BARBIN, 1988 : 528.

MATERIAL EXAMINED. — **Italy**. The Manchester Museum, U.K. : slides #7488/t40, #7490/140 of *Catenicella septentrionalis*, Waters Collection, from Montecchio Maggiore, Upper Eocene. Dipartimento di Geologia dell'Università di Padova : specimens from Pannone P1 and Toara, Collezione micropaleontologica, Upper Eocene.

DESCRIPTION. — Segments up to 4.22 mm long and 0.51-0.56 mm wide, with up to 8 zooids per segment. Zooids alternating, 0.48-0.74 mm long and ~0.30 mm wide, relatively slender, the most proximal zooid of a segment more or less claviform and proximally tapered. The axial furrow between the zooids zigzagging along the segment. Frontal shield a gymnocyst, almost evenly perforated (fewer centrally) by numerous pores. Orifice with a broad U-shaped sinusoidal poster, the proximal rim defined by a raised pair of short broad costae, with a thin suture-line between them and each with a proximal pore. Adjacent to the orifice is a pair of avicularia, the axial one possibly sometimes aborted, otherwise facing obliquely frontally, the marginal one facing laterally; each somewhat projecting, each with a semicircular opesia, complete cross-bar, and short triangular rostrum; a tiny pore-chamber occurs frontally between each avicularium and the adjacent costa. Ovicell subglobular, evidently smooth, covering approximately half the frontal shield of the distal zooid. Dorsal surface of segment smooth-surfaced, the basal wall of each zooid somewhat convex, with only a single tiny pore-chamber behind the lateral avicularium. The interzooidal furrow traces a sinuous course along the segment between the zooids.

DISTRIBUTION. — Northeast Italy, Upper Eocene.

CONGENERIC SPECIES. — Three other species may possibly be included in this genus. These are :
[?]Catenicella granulosa Canu, 1908, Lutetian, near Paris, France.
Catenicella subseptentrionalis Canu & Bassler, 1917, Rupelian, southwest Arkansas, USA.
Ditaxiporina bifenestrata Cheetham, 1963, Rupelian, southwest Arkansas, USA.

REMARKS. — The genus *Ditaxiporina* was discussed quite thoroughly by CHEETHAM (1963), who described a new species, *D. bifenestrata*, with bifenestrate ovicells. In all other respects this species closely resembles the type species. Although it is not impossible that the ovicell was truly bifenestrate, the possibility that the fenestrae represent eroded predator bore-holes cannot be ignored - selective predation of ovicells has been noted by GORDON & D'HONDT (1991) in the calenicelloidean genus *Petalostegus*. Apart from the type species, the ovicell has not been discovered in any of the other species ascribed to *Ditaxiporina*, which may be distinguished on the basis of zooidal characters, such as details of size, distribution of frontal pores, and placement and orientation of the avicularia.

Source : MNHN, Paris

The exact status of *Catenicella granulosa* is uncertain. It was described as lacking avicularia and, indeed, the unique (holotype) specimen (fig. 9 e) appears to lack them, but the preservation is so poor that it is impossible to be certain. The dorsal surface [now inaccessible, since it was glued to the slide after CANU (1908) illustrated it] was described as smooth and convex. Thanks to the courtesy of Dr Agnès RAGE (Institut de Paléontologie, Muséum national d'Histoire naturelle, Paris) and Dr Paul TAYLOR (Department of Palaeontology, The Natural History Museum, London) it was possible to borrow and scan (uncoated) the holotype specimen. Because of the poor state of preservation it is impossible to be certain if it belongs to *Ditaxiporina*, though the description of a smooth dorsal surface would support this.

The occurrence of uni-, bi-, tri-, and multizooidal segments in the fossil samples (see WATERS, 1891) suggests the manner in which the segments grew. More significantly, the unizooidal segments are nearly identical to those of the present-day species *Vasignyella otophora* (Kirkpatrick, 1890), which has only unizooidal segments. In fact, the similarity is *so* great (GORDON & D'HONDT, 1991) that it is inconceivable that *Vasignyella* is unrelated to *Ditaxiporina*. For this reason, *Vasignyella* is here separated from the Savignyellidae and included in the Calenicellidae.

Subfamily VASIGNYELLINAE subfam. nov.

DIAGNOSIS. — As for the sole included genus.

Genus *VASIGNYELLA* Gordon 1989b

DIAGNOSIS. — All segments unizooidal. Zooidal frontal shield an evenly perforated gymnocyst. Proximal rim of orifice composed of a vestigial pair of costae, lacking lumen pores (pelmata). Between each costa and the distolateral pair of avicularia is a tiny pore-chamber. A row of small round uniporous pore-chambers occurs along each margin. Ovicell unknown. Dorsal surface smooth, with only a small pore-chamber behind each avicularium.

RANGE. — Holocene.

TYPE SPECIES. — *Catenaria otophora* Kirkpatrick, 1890.

Vasignyella otophora (Kirkpatrick, 1890)

Fig. 11 a-b

Catenaria otophora Kirkpatrick, 1890 : 17, pl. 5, figs 1-1c. — PHILIPPS, 1900 : 441. — THORNELY, 1912 : 139. — GRAVELY, 1927 : 89, pl. 11, fig. 6.
Savignyella otophora - HARMER, 1957 : 763, pl. 51, figs 19-21. — DUMONT, 1981 : 636. — WINSTON, 1986 : 27.
Vasignyella otophora - GORDON, 1989b : 453, figs 13-15. — RYLAND & HAYWARD, 1992 : 247, fig. 14a.

MATERIAL EXAMINED. — **Western Samoa.** N.Z. Oceanographic Institute : sparse material from Sa'aga, Upolu Island, collected by J.E. MORTON (University of Auckland).

DESCRIPTION. — Colony erect, comprising branching uniserial chains of unizooidal segments. Zooids claviform, bent somewhat forward, 0.79–1.30 mm long and 0.24–0.25 mm wide. Frontal shield a porous

FIG. 10 a-d. — *Ditaxiporina septentrionalis* (Waters) : **a**, segment of four autozooids (x 79) ; **b**, close-up of the right-hand proximal zooid in fig. a - note the lumen pores in the suboral costae (x 317) ; **c**, ovicelled zooids (x 88) ; **d**, dorsal surface of zooids (x 108). (Figs a-b, Pannone, Italy, Upper Eocene ; Waters Collection, Manchester Museum. Figs c-d, same locality, Braga Collection, Dipartimento di Geologia, Paleontologia e Geofisica dell'Università di Padova.)

FIG. 10 e. — *Ditaxiporina granulosa* (Canu), uncoated unique holotype segment affixed to slide (x 56). (From Orglandes, near Paris, Middle Eocene ; slide R53352, Institut de Paléontologie, Muséum national d'Histoire naturelle, CANU Collection.)

Source : MNHN, Paris

Source : MNHN, Paris

gymnocysl. Orifice with a pair of small condyles delimiting the anter from the broadly V-shaped poster. Proximal rim of orifice delimited by a pair of short broad costae with a median suture. Lateral-oral avicularia with triangular rostrum, the cross-bar lacking, facing frontolaterally. Ovicell unknown. A row of ~5 small circular pore-chambers occurs along each lateral margin, the septulum uniporous. An additional small pore-chamber occurs on each side between the avicularium and the adjacent costa, and behind the avicularian rostrum. Dorsal surface smooth.

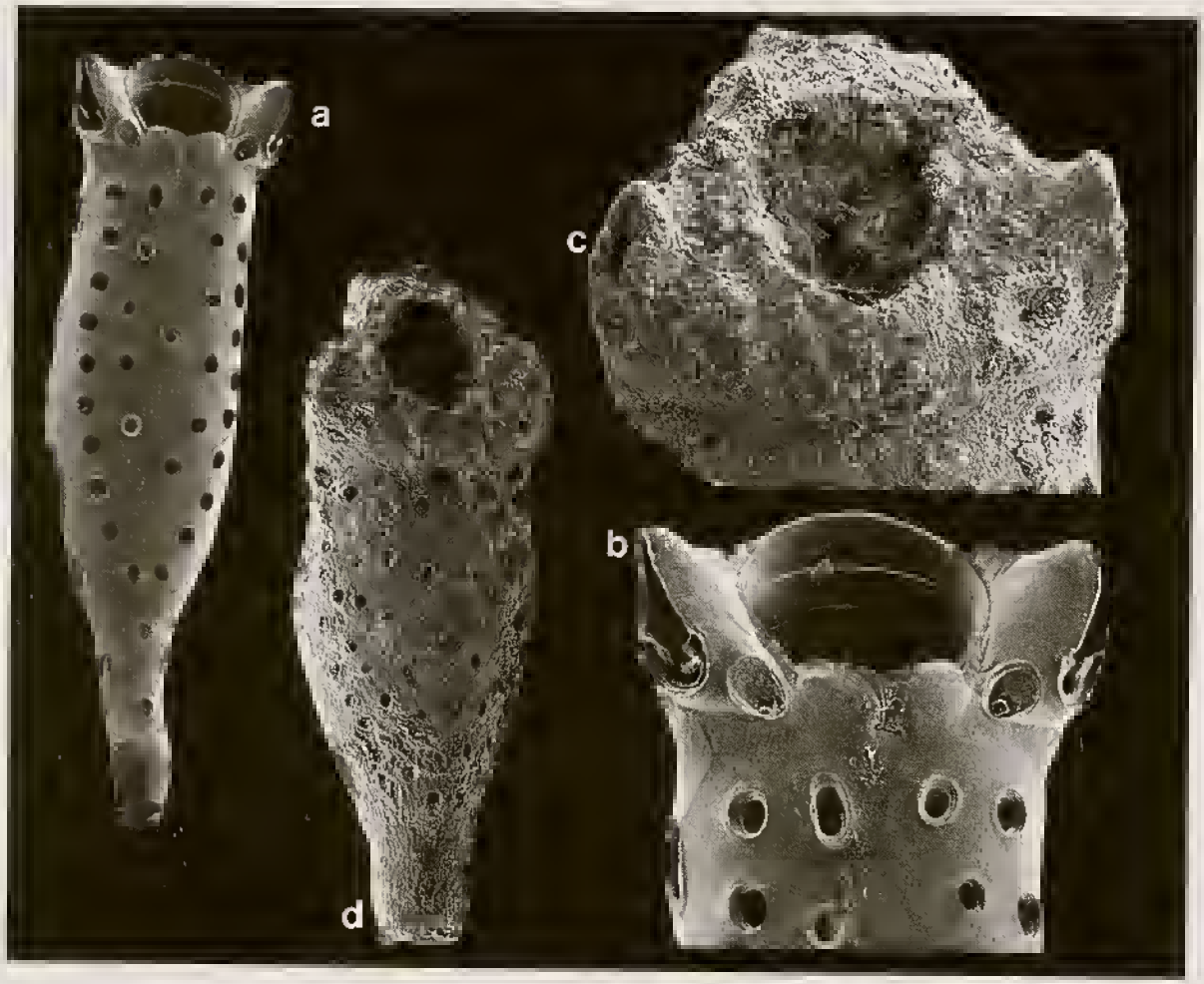

FIG. 11 a-b. — *Vasignyella otophora* (Kirkpatrick) ; **a**, autozooid (x 103) ; **b**, same, close-up of orificial region -note the small pore-chambers between the avicularia and suboral costae, and the lack of lumen pores in the latter (x 205). (From Sa'aga, Upolu Island, Western Samoa.)

FIG. 11 c-d. — *Ditaxiporina septentrionalis* (Waters) : **c**, orificial region of another unizooidal segment ; cf. plate 10, b - note the lumen pores in the suboral costae (x 299) ; **d**, young unizooidal segment prior to budding of the additional zooids (x 149). (From Pannone, Italy, Upper Eocene ; Waters Collection, Manchester Museum.)

DISTRIBUTION. — Sudanese Red Sea, Indian Ocean, China Sea, Philippines, New Guinea, Great Barrier Reef, Fiji, Western Samoa, intertidal to 49 m.

REMARKS. — Although the unizooidal segments of *Ditaxiporina septentrionalis* appear to lack the small lateral pore-chambers found in *Vasignyella*, the arrangement of elements in the orificial region is extraordinarily similar, including the presence of small pore-chambers between the avicularia and costae and behind the avicularia. The costae of *Vasignyella otophora* lack lumen pores, however, and individual zooids are somewhat larger than those of *D. septentrionalis*. There is one other difference, which may be significant in view of its otherwise apparent universality among ditaxiporines - viz. the lack of an avicularian cross-bar in *Vasignyella*.

Source : MNHN, Paris

At present, *Vasignyella* is monotypic and has no known fossil record. The absence of small lateral pore-chambers in *Ditaxiporina* may indicate that *Vasignyella* was not derived directly from it but from a common predecessor. Significantly, ovicells have never been found in *Vasignyella*, possibly indicating internal brooding. Because of this, we propose a separate subfamily, Vasignyellinae, additionalty characterised by only unizooidal segments and the lack of an avicularian cross-bar. In our opinion, *Vasignyella* has no direct relationship with *Savignyella* Levinsen and *Halysisis* Norman, although we suspect that the Savignyellidae may nevertheless be derived from an early catenicelloidean stock. We intend to discuss the genera of the Savignyellidae in a future paper.

SYSTEMATIC AFFINITIES

On the basis of the mixture of shared and derived characters among the genera discussed in this paper, we conclude that, with the exception of *Vasignyella*, all the other genera may be allied in the one subfamily, Ditaxiporinae Stach, 1935a, in which the family Ditaxiporinidae Cheetham, 1963 may be subsumed.

Diversification of the family Catenicetlidae (Maastrichtian to present day) from the Cribrilinidae *sensu lato* presumably occurred during the Senonian, though the details are unknown. Although some cribrilinids evidently had articulated colonies, the segments were stick-like, not oligozooidal. Segments of one or a few zooids, and relatively large ovicells, are shared with another catenicelloidean family, the Petalostegidae, which may be regarded as a sister group. These characters are thus synapomorphies for these two families. In the subfamily Ditaxiporinae, ancestral characters (plesiomorphies) include multiple costal elements, small or linear pore-chambers, and lateral-oral avicularia. Derived characters (apomorphies) include vestigial suboral costae or no costae, enlarged pore-chambers (especially dorsally), and gymnocystal ridges. The assignment of morphological polarities is based on evident trends in other catenicelloideans as well as in hippothooideans (separately derived from cribrilinids), viz, a reduction in the size of the costal shield and/or the number of costal elements with a concomitant increase in the area of either gymnocyst or cryptocystal elements (e.g., extracostal windows and/or pore-chambers), with accompanying specialisations (see BANTA & WASS, 1979; GORDON & D'HONDT, 1991). An autapomorphy found only among the Ditaxiporinae is biseriate multizooidal segments of non-reproductive zooids (in contradistinction to the occasionat fertile multizooidal segments in some species of *Catenicella*). Although known only from the Hotocene, *Bryosartor* is in many respects the least-derived ditaxiporine genus. In fact, there are significant similarities to *Costaticella* (Scuticellinae) in the multicostate spinocyst and the extracostal foramina. *Bryosartor* may be a much older genus than is indicated by its lack of a fossil record, a possibility supported by its occurrence on the northern Norfolk Ridge where a high proportion of archaic taxa occur (RICHER DE FORGES, 1987, 1990). Alternatively, *Bryosartor* may be a more recently derived genus which has retained ancestral features, but whose immediate predecessors are unknown.

There are several parallels between scuticellinc/catenicellinae and ditaxiporinc genera. For example, the earliest-occurring genera of both subfamilies have costal shields, and there are similar trends in the diversification of frontal-shield morphologies. *Strophipora* resembles *Ditaxipora* in the possession of a median gymnocystal band flanked by broad shallow pore-chambers that effectively make the frontal shield largely cryptocystal. For this reason, CANU and BASSLER (1929) proposed that the latter genus should be a subgenus of the former, a suggestion that STACH (1934) rightly rejected. *Cribricellina*, with its perforated gymnocystal shield, paraltets *Ahcheethamia* and *Ditaxiporina*.

BIOGEOGRAPHY

The distributions in time and space of the genera of Ditaxiporinae and Vasignyellinae are shown in figures 12 and 13. Apart from the occurrence of two species of *Ditaxiporina* in southwest Alabama, the combined distribution of all the taxa is notably Tethyan. For the Ditaxiporinae, there are two main distributional clusters - amphi-Atlantic/European, and Australasian. *Ditaxiporina* is the only American (and amphi-Atlantic) genus. Interestingly,

Source : MNHN, Paris

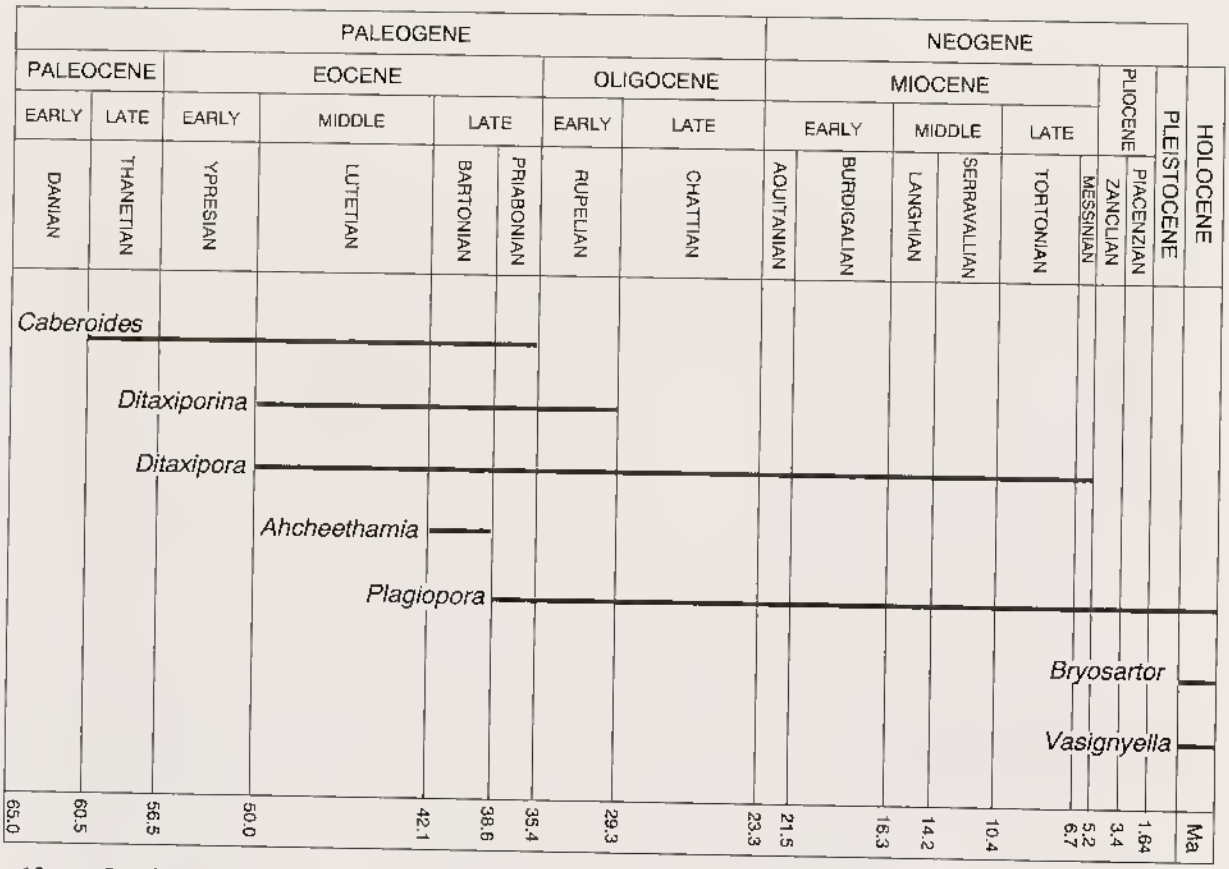

FIG. 12. — Stratigraphic distribution of the genera of the catenicellid subfamilies Ditaxiporinae and Vasignyellinae throughout the Cenozoic [chronometric scale based on HARLAND *et al.* (1990)].

FIG. 13. — Biogeographic distribution of the genera of the catenicellid subfamilies Ditaxiporinae and Vasignyellinae.

Source : MNHN, Paris

the earliest-known genus, *Caberoides*, achieved a potentially Tethyan-wide distribution by the Ypresian, ranging from the Northeast Atlantic to Chatham Island, New Zealand within 10-Ma. Clearly, the earliest ditaxiporines must be sought in the Danian or Maastrichtian. Like *Caberoides*, *Ditaxipora* is found at either end of the Tethyan corridor. It is significant that the oldest species of both of these genera are European, indicating that the Australasian taxa are derivative. LAGAAIJ and COOK (1973) and BRAGA (1987) have documented similar distributions in other cheilostomes, from which BRAGA concluded that faunal migration was eastwards from the Mediterranean to the Indo-Pacific. The information presented here supports that scenario for the amphi-Tethyan ditaxiporine genera.

The Ditaxiporinae of the western area of Tethys, belonging to the Paleogene of Venetia, occur in levels that are sometimes thick and continuous. Reported in the literature as 'Bryozoa marls' or 'Brendola marls', they are a key bed in studying the Upper Eocene sequences and are very rich in bryozoans. They outcrop over a wide area, including the Southern Trentino, the Lessini Mountains, the Berici Mountains, the piedmont area of the Asiago plateau, and the western Treviso Hills. This area, here called the Venetia shelf, was a structural high (fig. 14) where shallow-water marly calcareous deposits (nummulitic limestones, fossiliferous marls) were laid down. It corresponds largely to the resurrected Trento platform, an important Liassic structure drowned and successively overlain by Upper Jurassic pelagic limestones of the Ammonitico Rosso Formation (BOSELLINI, 1989).

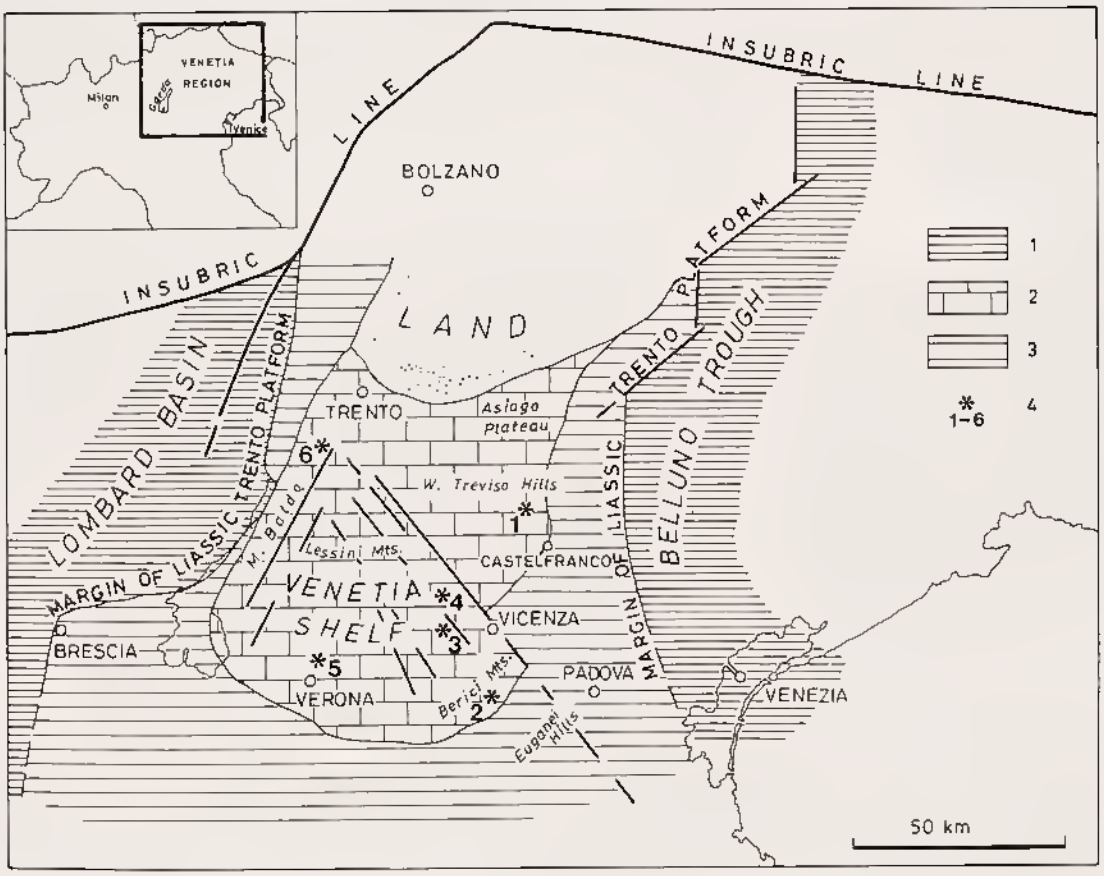

FIG. 14. — Location of the Upper Eocene bryozoan outcrops in the Venetia shelf, an important paleogeographic structure in the western Tethyan basin (modified from Bosellini 1989). Explanation of symbols:

1 : westward - marly limestones (Scaglia cinerea Formation); eastward - marls and sandy and calcareous shales (flysch facies)

2 : shallow water deposits (shelf facies)

3 : hemipelagic deposits

4 : main Upper Eocene bryozoan outcrops of Venetia (NE Italy), marked by asterisks (*): 1, Possagno; 2, Brendola-Toara, Monteccio di Costozza; 3, Val di Lonte; 4, Priabona; 5, Verona; 6, Pannone.

Source : MNHN, Paris

Paleoecologically, the Venetia shelf was marginally characterised by patch reefs, lagoons, and coastal embayments, with coralline-algal meadows and sublittoral bryozoan associations. The Bryozoa marls show an extremely rich diversity, with abundant representation of rigid-erect branching growth forms, indicative of relatively fast water flows well supplied with particulate food, especially microalgae. There were also articulated, rod-like, and vagrant colonial morphologies. Thus, in addition to catenicellids, there were also stratigraphically and paleoecologically significant species like *Lacrimula perfecta* (Accordi), typically associated with soft seafloor sediments of carbonate mud or more or less muddy sands.

A significant diversity occurs among the petrofacies of the different marginal deposits of the Venetia shelf. For example, the residue of the Pannone washed samples (western area) shows extrabasinal clasts (quartz, potassium feldspar, mica), presumably coming from a source area containing granitic and metamorphic rocks of the neighbouring northern land. In the eastern area (Possagno), silty clayey or clastic distal sediments prevail, originating from the eastern platforms or the above-mentioned area. In the centre of the shelf, east of Lake Garda (fig. 14, inset), the Bryozoa levels are are fairly rich in carbonates and contain numerous nummulites, bivalves, algae, and coral fragments. The bryofaunas are, however, quite uniform and would not seem to have been limited by environmental factors.

According to sedimentological characteristics, faunal content, growth-form parameters, and inferences concerning the species in life, the depth range of the shelf would have been within the photic zone of the inner-outer interval, not more than 100 m. The sea was warm-temperate or subtropical, with well-oxygenated water of normal salinity, judging from the high species diversity of the Bryozoa. In summary, we can hypothesize that the modern, predominantly Australasian, distribution of catenicellids (including the Ditaxiporinae and Vasignyellinae) may be derived from a wider circumtropical Paleogene distribution (cf. LAGAAIJ & COOK, 1973; BRAGA, 1987).

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Source : MNHN, Paris

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Source : MNHN, Paris

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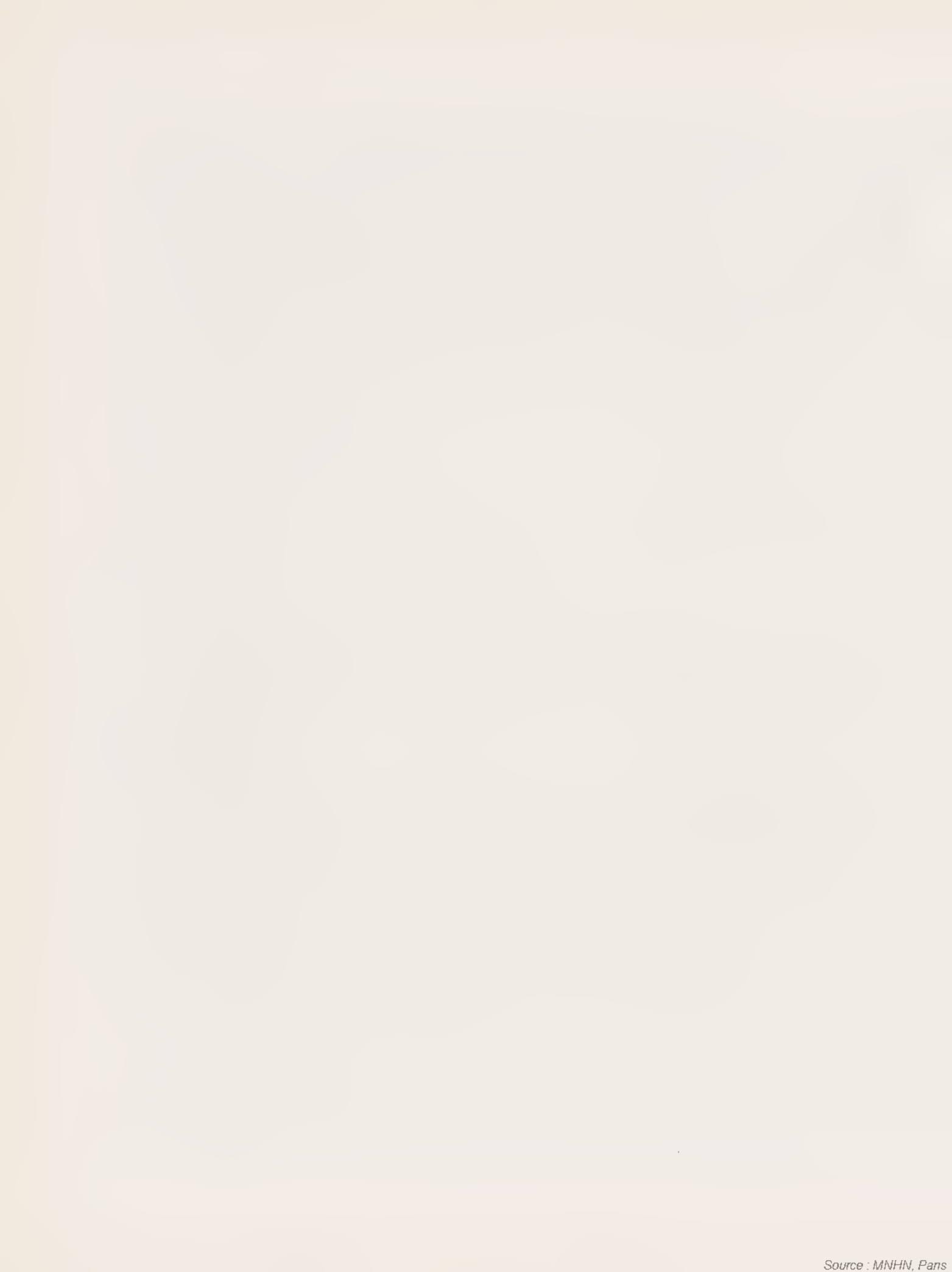

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4

Cirripedia Thoracica : Verrucomorpha of New Caledonia, Indonesia, Wallis and Futuna Islands

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ABSTRACT

Verrucomorpha from deep sea collections made by several French cruises in New Caledonian area (including Chesterfield and Loyalty Islands), Wallis Island and Futuna Island waters, and by the French-Indonesian cruise KARUBAR in Indonesian waters, over the period 1985-1993, are discussed. The fauna includes 16 species, seven of which are new; the bathymetric and geographic ranges of many other taxa are extended, making this one of the most diverse verrucomorph faunas known. The status of species within both *Altiverruca* and *Metaverruca* is considered, with six names being synonomised with *Metaverruca recta* (Aurivillius), and a key to genera of the Verrucidae is given.

The distribution of the Verrucidae in the region is discussed, with *Metaverruca recta* being confirmed as the species with the greatest geographic, bathymetric and stratigraphic distribution of any verrucid.

RÉSUMÉ

Cirripedia Thoracica : Verrucomorpha de Nouvelle-Calédonie, d'Indonésie et des îles Wallis et Futuna.

Les Verrucomorphes, principalement bathyaux, récoltés lors de diverses campagnes françaises au large de la Nouvelle-Calédonie et des îles Loyauté, Chesterfield, Wallis et Futuna et lors de la campagne franco-indonésienne KARUBAR dans les eaux indonésiennes, entre 1985-1993, sont étudiés ici. Seize espèces ont été trouvées, parmi lesquelles sept sont nouvelles pour la science. La faune des Verrucomorphes étudiée ici apparaît ainsi comme l'une des plus diversifiée connue dans une même région. Les distributions bathymétrique et géographique de plusieurs espèces sont étendues.

Le statut des espèces des genres *Altiverruca* et *Metaverruca* est examiné. Six espèces sont mises en synonymie avec *Metaverruca recta* (Aurivillius), et une clé des genres de la famille Verrucidae est proposée.

La répartition des Verrucidae dans la région prospectée est discutée, et il est confirmé que *Metaverruca recta* est l'espèce ayant la plus vaste répartition géographique, bathymétrique et stratigraphique de tous les Verrucidae.

BUCKERIDGE, J. S., 1994. — Cirripedia Thoracica : Verrucomorpha of New Caledonia, Indonesia, Wallis and Futuna Islands. *In* : A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Volume 12. *Mém. Mus. natn. Hist. nat.*, **161** : 87-125. Paris ISBN 2-85653-212-8.

Source : MNHN, Paris

INTRODUCTION

The deep sea verrucomorph cirripede fauna of Indonesia, New Caledonia and the Wallis and Futuna Islands had not been collected prior to 1977; although previous work on verrucomorphs (generally shallow water species) in the Indo-Pacific region has been carried out by HOEK (1907, 1913); PILSBRY (1907, 1912); BROCH (1922, 1932); GRUVEL (1907, 1920); ROSELL (1981, 1991); NILSSON-CANTELL (1929); FOSTER (1978); BUCKERIDGE (1983) and ZEVINA (1987, 1988). This paper records material collected from New Caledonian waters by BIOCAL (1985), MUSORSTOM 4 (1985), CHALCAL 2 (1986), BIOGEOCAL (1987), SMIB 5 (1989), SMIB 8 (1993); from the Loyalty Islands region by MUSORSTOM 6 (1989); from the Chesterfield Islands region by MUSORSTOM 5 (1986) and CORAIL 2 (1988); from the volcanoes south of Vanualu by VOLSMAR and GEMINI (1989); from the Wallis and Futuna Islands region by MUSORSTOM 7 (1992), and from Indonesian waters by KARUBAR (1991) expeditions. Some specimens collected by the MUSORSTOM 3 (1985) expedition in the Philippines and not studied by ROSELL (1991) are also recorded. The collections examined have shown an exceptional diversity of Verrucidae : from the 124 sites considered, 16 verrucid species are recorded; seven of these are new to science, and the range of many other taxa is extended. This paper also considers aspects of verrucomorph systematics, biogeography and distribution.

The Verrucidae are characterised by six calcareous plates. The shell is made up of the carina and rostrum, plus a tergum and scutum, the latter two having moved from the operculum to become "fixed" as part of the shell wall. The remaining plates, a tergum and scutum (hereafter termed movable plates) make up the operculum. It appears to be totally random as to whether the "left" or "right" opercular plates move to complete the shell wall (DARWIN, 1854), in the specimens studied the ratio being close to 50:50. However, in *Neoverruca*, right or left sidedness depended on which side the juveniles settled on, relative to the current (NEWMAN, 1989).

TYPES : All new taxa are either from New Caledonian or Wallis and Futuna waters; holotypes are held by the Muséum national d'Histoire naturelle (e.g. MNHN-Ci) in Paris, France. Paratypes are held by the Muséum national d'Histoire naturelle, and when numbers of specimens available permit, by the National Museum of Natural History, Washington (e.g. USNM) and UNITEC Institute of Technology, New Zealand (e.g. CAX).

In addition to types, figured material collections have also been allocated registration numbers (e.g. MNHN-Ci, held by the Muséum national d'Histoire naturelle, Paris).

In the lists of material examined the abbreviations of the gears used are : CC = otter trawl (shrimps); CP = beam trawl; DC = Charcot dredge; DS = Sanders epibenthic dredge; DW = Warren dredge; KG = Usnel Box-Corer.

LIST OF SPECIES

Genus ***VERRUCA*** Schumacher, 1817
Verruca albatrossiana Pilsbry, 1912

Genus ***ALTIVERRUCA*** Pilsbry, 1916
Altiverruca cristallina (Gruvel, 1907)
Altiverruca galapagosa Zevina, 1987
Altiverruca laeviscuta sp. nov.
Altiverruca navicula (Hoek, 1913)
Altiverruca nitida (Hoek, 1883)

Genus ***CAMERAVERRUCA*** Pilsbry, 1916
Cameraverruca nodiscuta sp. nov.

Genus ***BROCHIVERRUCA*** Zevina, 1993
Brochiverruca dens (Broch, 1932)
Brochiverruca polystriata sp. nov.

Genus ***METAVERRUCA*** Pilsbry, 1916
Metaverruca defayeae sp. nov.
Metaverruca norfolkensis sp. nov.
Metaverruca pacifica sp. nov.
Metaverruca plicata sp. nov.
Metaverruca recta (Aurivillius, 1898)

Genus ***ROSTRATOVERRUCA*** Broch, 1922
Rostratoverruca intexta (Pilsbry, 1912)
Rostratoverruca kruegeri (Broch, 1922)

Source : MNHN, Paris

SYSTEMATIC ACCOUNT

Order THORACICA Darwin, 1854

Suborder VERRUCOMORPHA Pilsbry, 1916

DIAGNOSIS. — Sessile thoracican cirripedes, with an asymmetrical shell wall comprising a fixed sculum, fixed tergum, rostrum and carina, closed by a movable scutum and movable tergum (Verrucidae), sometimes including a rostrolatus and a carinolatus on the movable side (Proverrucidae), or basal whorls of imbricating plates (Neoverrucidae); basis membranous or calcareous; caudal appendages usually present; mandible generally tridentoid; crest of bullate labrum usually bearing teeth.

DISCUSSION. — NEWMAN and HESSLER (1989) described *Neoverruca brachylepadoformis*, a living, abyssal species that demonstrated links between the Brachylepadomorpha and the Verrucomorpha. The significance of this find warranted a closer analysis of verrucomorph cirripedes, with a resultant split of the family, such that the revised Verrucidae comprise only those verrucomorphans with six plates.

Family VERRUCIDAE Darwin, 1854
(amend. NEWMAN & HESSLER, 1989)

DIAGNOSIS. — Verrucomorphans with the primary wall (carina, rostrum, fixed scutum, fixed tergum), in contact with the substratum and without latera of any sort.

DISCUSSION. — In 1916, PILSBRY proposed four "Sections" or subgenera in the genus *Verruca*, and these were later added to by BROCH (1922), and ZEVINA (1978), who also elevated the subgenera to generic status. This paper follows ZEVINA's revision and includes her 1993 genus : *Brochiverruca*.

The presence of a myophore on the fixed scutum is generally of considerable value in classification, although in *Brochiverruca*, the myophore is absent from *B. dens* but present in *B. polystriata* sp. nov. It should also be noted that the angle of the operculum to the base may vary, particularly in *Altiverruca*, where the nature of the substrate appears to have a strong influence. *Metaverruca* and *Verruca* however, appear far more consistent, as I have not seen specimens with the operculum even close to perpendicular to the base. PILSBRY (1916) concluded that much could be deduced about the habitat of verrucids by the shell shape. His material demonstrated that shallow water forms were invariably depressed, with broadly spreading walls, whilst erect forms were found in deep water. The present collection, with depressed forms like *Metaverruca recta* having been collected from depths in excess of 2000 metres, does not bear this out.

I am a little uncertain about the status of *Spongoverruca* Zevina, (1978). Although some verrucids appear to be host specific, I am not confident that this is a sufficient criterion to warrant generic separation. Further, many workers, from PILSBRY (1916), consider a fixed scutal myophore to be of importance in defining verrucid genera, unfortunately in her diagnosis of *Spongoverruca*, ZEVINA makes no specific reference to this character (V. MELNIKOV, pers. com.).

Morphology of the soft parts can be of considerable help in identifying species, particularly of *Metaverruca*. However all new taxa described here possess differences in shell morphology as well, with most species being able to be identified on shell morphology alone. Most verrucids possess a mandible with a tridentoid cutting edge, the lower angle being pectinate, hirsute or a mixture of both. The first maxilla generally has one or two prominent upper spines, a central notch that may be hirsute or spinose, and a lower angle with shorter spines and hairs. Both the penis and caudal appendages vary considerably between taxa, ranging from less than the length of the basal segment of the pedicel of cirrus VI, to more than the length of the entire cirrus. The nomenclature used in this paper is explained in figure 1.

Source : MNHN, Paris

STRATIGRAPHIC RANGE. — ?Middle, Upper Cretaceous to Recent, Europe, South America, Australasia.

DISTRIBUTION. — Cosmopolitan in present seas.

Key to genera of the Verrucidae

1. Rostral and carinal apices marginal 2
— Rostral apex only removed from margin ..... *Rostratoverruca*
— Rostral and carinal apices removed from margin ..... *Brochiverruca*

2. Myophore present on fixed scutum 3
— Myophore absent on fixed scutum 4

3. Operculum nearly vertical to base ..... *Cameraverruca*
— Operculum nearly parallel to base ..... *Metaverruca*

4. Opercului nearly vertical to base 5
— Opercului nearly parallel to base ..... *Verruca*

5. Not embedded in sponge ..... *Altiverruca*
— Embedded in sponge ..... *Spongoverruca*

Genus *VERRUCA* Schumacher, 1817

Verruca "Section B"- PILSBRY, 1916 : 23.
Verruca (Verruca) - FOSTER, 1978 : 68.
Verruca - ZEVINA, 1978 : 1812. — NEWMAN & HESSLER, 1989 : 268.

DIAGNOSIS. — Verrucids with apices of rostrum and carina marginal; fixed scutum without myophore; operculum parallel to base.

TYPE. — *Lepas stroemia* Müller, 1776. North Atlantic, northern Europe, Mediterranean, ?Red Sea, intertidal - 500 metres.

SPECIES. — 24 taxa are presently attributed to this genus : *V. stroemia* (Muller, 1776), *V. laevigata* (Sowerby, 1827), *V. prisca* Bosquet, 1853, *V. pusilla* Bosquet, 1857, *V. nuciformis* Buckeridge, 1983, *V. rocana* Steinmann, 1921, *V. spengleri* Darwin, 1854, *V. tasmanica tasmanica* Buckeridge, 1983, *V. tasmanica chatheca* Buckeridge, 1983, *V. cookei* Pilsbry, *V. withersi* Newman & Schram, 1980, *V. alba* Pilsbry, 1907, *V. alba caribbea* Pilsbry, 1916, *V. alba barbadensis* Pilsbry, 1916, *V. calotheca* Pilsbry, 1907, *V. calotheca flavidula* Pilsbry, 1916, *V. calotheca heteropoma* Pilsbry, 1916, *V. calotheca niasiensis* Nilsson-Cantell, 1929, *V. floridiana* Pilsbry, 1916, *V. xanthia* Pilsbry, 1916, *V. xanthia insculpta* Pilsbry, 1916, *V. entobapta* Pilsbry, 1916, *V. macani* Stubbings, 1936, *V. scrippsae* Zullo, 1964.

DISCUSSION. — The status of *Verruca sensu stricto* is a little unclear at present. There are forms like *Verruca stroemia* and *V. laevigata* that clearly fall into a distinct group : the shells possess a low profile, are found in higher energy, shallow water environments, and of necessity have the operculum approximately parallel to the substrate. Deeper water forms like *Verruca albatrossiana* Pilsbry are quite different, and although the operculum is indeed "sub-parallel" to the basis, *V. albatrossiana* is normally found growing attached to cylindrical objects like cidaroid spines. As such the base is curved, and in theory, will at some point parallel the operculum. I believe greater consideration of genus *Verruca* is warranted, and it is likely that the *V. albatrossiana*-like forms will form a separate genus. As there is only one "*Verruca*" species present in this collection, it is considered prudent to await consideration of a wider range of material before splitting the genus. A further complication exists in the

Source : MNHN, Paris

terminology used by BROCH (1932), where he uses the term *Eu-Verruca* for the central group of genus *Verruca sensu lato*. In a somewhat ambiguous footnote, BROCH (1932 : 45) states that *Eu-Verruca* "... may serve to bring confusion about".

STRATIGRAPHIC RANGE. — Cretaceous (Australia, New Zealand, Columbia, western Europe), Palaeogene (New Zealand, Argentina, Chatham Islands).

DISTRIBUTION. — Pacific, North Atlantic, Mediterranean, Caribbean, ?Red Sea, Indian Ocean, intertidal - 620 metres.

Verruca albatrossiana Pilsbry, 1912

Fig. 1 a-f

Verruca albatrossiana Pilsbry, 1912 : 292.
Verruca (Eu-Verruca) albatrossiana - BROCH, 1922 : 290, figs 39, 40.
Verruca grex Hoek, 1913 : 142, pl. 11, figs 7-13, pl. 13, figs 11-13.

MATERIAL EXAMINED. — **Indonesia**. KARUBAR : stn CP 39, 07°45'43"S, 132°28'22"E, 466-477 m, 28.10.1991 ; 19 specimens (MNHN-Ci 2291), on cidaroid spines. — Stn CC 57, 08°15'48"S, 131°56'38"E, 603-620 m, 31.10. 1991 : 9 specimens, on cidaroid spines.

DIAGNOSIS. — *Verruca* with rostrum and carina low, strongly developed longitudinally to give the shell an oblique appearance; fixed scutum considerably larger than fixed tergum, opercular plates displaced carinally.

DESCRIPTION. — Shell white, walls ribbed vertically; obliquely skewed towards the carina; rostrum moderately low, with an upper, broad triangular portion extending towards the carina; carina long, low, extending beneath much of the rostrum.

Fixed scutum considerably larger than fixed tergum, with a "folded over" portion on movable scutal margin, forming a zone confluent with the plane of the operculum; both fixed tergum and scutum with apices concurrent with those of the movable plates.

Movable scutum a little narrower than the movable tergum, triangular, with five diagonal ribs, primary rib arced towards tergal margin, strongly rounded, terminating at the basi-tergal angle, first secondary rib immediately adjacent to primary rib, secondary ribs interlocking with tergum; apex beaked.

Movable tergum quadrilateral, apex slightly curved towards scutum, primary apico-basal rib almost straight, with four secondary ribs.

Mandible tridentate, lower angle pectinate and divided into two portions; first maxilla with two large upper spines, a pectinate notch, lower angle with five shorter spines. Crest of labrum with fine, numerous teeth, palps pointed.

Cirrus I relatively hirsute compared with other cirri, inner ramus shorter; penis a little less than two thirds the length of cirrus VI; caudal appendages very long. Cirri from MNHN-Ci 2291 possessed the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
7.0	9,18	7,18	13,19	12,19	18,19	21,22	27

DISCUSSION. — This species is characterised by "the unusual length of the rostrum and fixed tergum" (PILSBRY, 1912), giving a distinct obliqueness to the shell, with a resultant displacement the opercular plates carinally. It falls into a group with *Verruca grex* Hoek, 1913, but is distinguished from *V. grex* by possessing a less elevated operculum, and fewer apico-basal ribs on the movable scutum.

DISTRIBUTION. — Indo-Pacific, 345-620 metres.

Source : MNHN, Paris

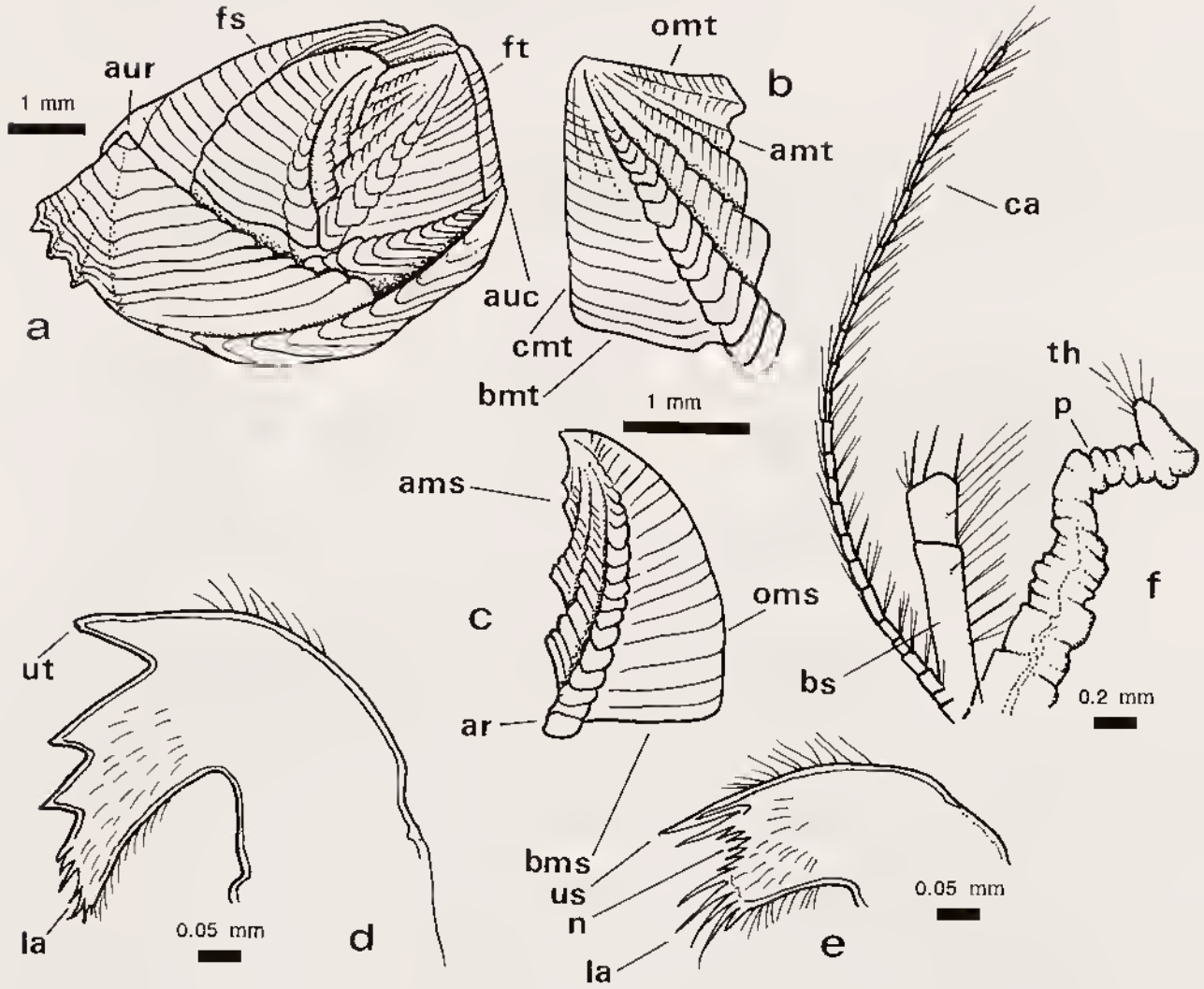

FIG. 1. — *Verruca albatrossiana* Pilsbry, 1912 : **a**, complete shell (right side), MNHN-Ci 2291; **b**, movable tergum (left, exterior); **c**, movable scutum (left, exterior); **d**, mandible; **e**, first maxilla; **f**, pedicel of sixth cirrus, with penis and caudal appendage attached. All material from KARUBAR, stn CP 39. Figures b and c are at the same scale.

Abbreviations : *a.m.s.* = articular margin of the movable scutum; *a.m.t.* = articular (scutal) margin of the movable tergum; *a.r.* = apico-basal ridge of scutum (and tergum); *a.u.c.* = apical umbone of carina; *a.u.r.* = apical umbone of rostrum; *b.m.s.* = basal margin of the movable scutum; *b.m.t.* = basal margin of the movable tergum; *b.s.* = basal segment of the pedicel of cirrus VI; *c.a.* = caudal appendage; *c.m.t.* = carinal margin of the movable tergum; *f.s.* = fixed scutum; *f.t.* = fixed tergum; *l.a.* = lower angle of the first maxilla; *n.* = notch of first maxilla; *o.m.s.* = occludent margin of the movable scutum; *o.m.t.* = occludent margin of the movable tergum; *p.* = penis; *t.h.* = penis with hirsute terminus; *u.s.* = upper spine of the first maxilla; *u.t.* = upper tooth of the mandible.

Genus *ALTIVERRUCA* Pilsbry, 1916

Verruca "Section D": *Altiverruca* Pilsbry, 1916 : 40.
Verruca (Altiverruca) - FOSTER, 1978 : 68.
Altiverruca - ZEVINA, 1978 : 1813.

Source : MNHN, Paris

DIAGNOSIS. — Verrucids with erect form, bases of plates not inflected; operculum close to vertical; myophore absent.

TYPE. — *Verruca hoeki* Pilsbry, 1907 : 113. West Indies, 907-1060 metres.

SPECIES. — The 34 taxa presently attributed to this genus include : *A. gibbosa* (Hoek, 1883), *A. incerta* (Hoek, 1883), *A. obliqua* (Hoek, 1883), *A. nitida* (Hoek, 1883), *A. quadrangularis* (Hoek, 1883), *A. sulcata* (Hoek, 1883), *A. crenata* (Aurivillius, 1898), *A. erecta* (Gruvel, 1900), *A. longicarinata* (Gruvel, 1900), *A. radiata* (Gruvel, 1901), *A. cristallina* (Gruvel, 1907), *A. darwini* (Pilsbry, 1907), *A. hoeki* (Pilsbry, 1907), *A. mitra* (Hoek, 1907), *A. plana* (Gruvel, 1907), *A. cassis* (Hoek, 1913), *A. casula* (Hoek, 1913), *A. navicula* (Hoek, 1913), *A. bicornuta* (Pilsbry, 1916), *A. rathburniana* (Pilsbry, 1916), *A. cristallina laevis* (Broch, 1922), *A. gibbosa somaliensis* (Nilsson-Cantell, 1929), *A. aves* (Zevina, 1975), *A. angustiterga* Zevina, 1987, *A. galapagosa* Zevina, 1987, *A. gira* (Zevina, 1987), *A. sublima* Zevina, 1987, *A. sculpturata* Zevina, 1987, *A. longa* Zevina, 1988, *A. tchesunovi* Zevina, 1988, *A. vitrea* Zevina, 1988, *A. mollae* Zevina, 1990, plus the new species described here : *Altiverruca laeviscuta* sp. nov.

DISCUSSION. — *Altiverruca* is the largest verrucid genus known. On the basis of gross shell morphology, the material examined here suggests at least two groups within the genus. There are those with very laterally compressed shells (*A. galapagosa*, *A. laeviscuta*, *A. navicula*, and *A. nitida*); whilst the remaining species, *A. cristallina* possesses a more rounded cross-section. As discussed under *Verruca*, any subdivision of the genus is deferred until a wider range of taxa is able to be considered.

In his initial proposal of *Altiverruca*, PILSBRY stated that "Section D : Altiverruca" was characterised by species with very short caudal appendages. Since that time, on consideration of other features, further taxa have been included within the group (e.g. FOSTER, 1978), with some, like *A. navicula* and *A. nitida*, having very long caudal appendages.

DISTRIBUTION. — Cosmopolitan, 233- 4950 metres.

Altiverruca cristallina (Gruvel, 1907)

Fig. 2 a-h

Verruca cristallina Gruvel, 1907 : pl. 1, figs 9, 10.
Verruca cristallina laevis - BROCH, 1922 : fig. 41 a-d.
Verruca (Altiverruca) cristallina - ROSELL, 1989 : 24, Pl. 6. figs d-i. — ROSELL, 1991 : 34.

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn CP 5, 21°16.49'S, 166°43.56'E, 2340 m, 11.08.1985 : 20 specimens (MNHN-Ci 2321), on pumice. — Stn CP 23, 24°45.84'S, 166°20.33'E, 2040 m, 28.08.1985 : 30 specimens, on pumice and bivalves. — Stn CP 26, 20°39.66'S, 166°27.41'E, 1618-1740 m, 28.08.1985 : 3 specimens. — Stn CP 27, 22°05.52'S, 166°26.41'E, 1850-1900 m, 28.08.1985 : 29 specimens, on pebbles. — Stn KG 28, 23°05.47'S, 166°27.27'E, 1750 m, 28.08.1985 : 3 specimens. — Stn DW 44, 22°47.35'S, 167°14.50'E, 450 m, 30.08.1985 : 1 specimen, on coral. — Stn CP 57, 23°44'S, 166°58'E, 1490-1620 m, 01.09.1985 : 18 specimens, on pebbles. — Stn CP 58, 23°56.52'S, 166°40.55'E, 2660 m, 01.09.1985 : 1 specimen. — Stn DS 59, 23°56.21'S, 166°41.10'E, 2650 m, 02.09.1985 : 3 specimens. — Stn DW 66, 24°55.43'S, 168°21.67'E, 510 m, 03.09.1985 : 1 specimen. — Stn KG 71, 22°04.85'S, 167°32.70'E, 2100 m, 04.09.1985 : 1 specimen, on pumice. — Stn CP 72, 22°10'S, 167°33'E, 2100-2110 m, 04.09.1985 : 7 specimens, on pumice.

Loyalty Islands. MUSORSTOM 6 : stn 438, 20°23.00'S, 166°20.10'E, 780 m, 18.02.1989 : 2 specimens, on pumice.

Chesterfield Islands. MUSORSTOM 5 : stn DW 337, 19°53.80'S, 158°38.00'E, 412-430 m, 15.10.1986 : 1 specimen. — Stn DC 385, 20°53.60'S, 160°49.40'E, 745-750 m, 22.10.1986 : 5 specimens, on coral.

Wallis and Futuna Islands. MUSORSTOM 7 : stn CP 551, 12°15.3'S, 178°28.1'W, 791-795 m, 11.05.1992 : 7 specimens, on shell debris. — Stn CP 623, 12°34.2'S, 178°15.1'W, 1280-1300 m, 28.05.1992 : 1 specimen, on pebble.

DIAGNOSIS. — *Altiverruca* with carina and rostrum interlocking with up to six ribs; movable tergum with four to five articulating ribs, at least two of which articulate with the scutum; caudal appendages short.

Source : MNHN, Paris

DESCRIPTION. — Shell white, almost transluscent, less compressed laterally than most *Altiverruca*, with regular, sinusoidal growth lines; rostrum and carina interlock with two to three main ribs, but weaker interlocking occurs below this with another three to four ribs; base weakly calcified.

Fixed tergum and fixed scutum interlocking with a single rib only on larger specimens.

Movable tergum quadrangular, with three diagonal ribs, increasing to four in specimens over 5 mm in length, first rib strong, others decreasingly weaker away from diagonal.

Movable scutum triangular, relatively wide, with two diagonal ribs, which interlock with the tergum, the rib closest to the articular margin weak to absent in smaller specimens.

Mandible tridentate, second and third teeth pectinate on the upper surface; first maxilla with two large upper spines, notch with two small spines, lower angle with six to seven spines.

Labrum with finely toothed crest; palps pointed.

Cirrus I relatively hirsute compared with other cirri, inner ramus shorter, although it may have slighlty more segments; cirri II-VI with inner ramus shorter; penis short, slightly hirsute terminally; caudal appendages short. Cirri possessed the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
4.6	9,11	11,13	21,23	26,30	19+,30	32,35	9
4.8	13,12	11,14	19,21	29,33	32,35	32,35	9

+ incomplete ramis

Of the specimens examined, the length of the caudal appendages was close to that of the basal segment of the pedicel of cirrus VI.

DISCUSSION. — The considerable amount of material collected of this species has shown the differences between *Verruca cristallina cristallina* and *Verruca cristallina laevis* listed by BROCH (1932), as insufficient for continued separation. The strength of ribbing on the opercular plates is variable, with larger specimens developing stronger ribs (the smaller specimens described by BROCH, about 4 mm in diameter, had weaker ribs). The long caudal appendages (with up to 25 segments) noted by GRUVEL (1907) have not been recorded in either this material or in that of BROCH (1922), perhaps this anomaly could have been used to split the species, but I feel that there is little point in following this course of action, particularly in light of GRUVEL's rather schematic drawings.

Up to six interlocking ribs between rostrum and carina can be observed in this material; however, all the specimens described by BROCH (1922) showed only three ribs, although the specimens he studied appeared to be less than 4 mm in rostro-carinal diameter. These extra ribs, and any rib between fixed tergum and scutum, are considered ontogenetic :

r-c (mm)	rib between r & c	rib between fixed s & t
2.9	3	no
3.4	3	yes
3.8	5	yes
3.8	6	no
4.4	5	yes

The degree of mineralisation of the base also varies, with extensive calcification only evident in larger specimens.

Altiverruca allisoni Rao & Newman, 1972 is close to this species. RAO and NEWMAN have distinguished *A. allisoni* on the basis of its possessing seven interlocking ribs between rostrum and carina, lacking multiple interlocking ridges between the suture of the fixed tergum and scutum, and in lacking the small beaded ridges along the scutal margin of the rostrum. Although only six interlocking ribs were noted between rostrum and carina in this study, analysis suggests that the first distinguishing feature (and perhaps the second), may be ontogenetic. The best way to differentiate between the two species is on the basis of the movable scutum, which in *A. cristallina* possesses an extra longitudinal rib.

This collection has extended the known depth range for this species from 1600 to 2340 metres.

DISTRIBUTION. — Tropical Pacific, 233-2340 metres.

Source : MNHN, Paris

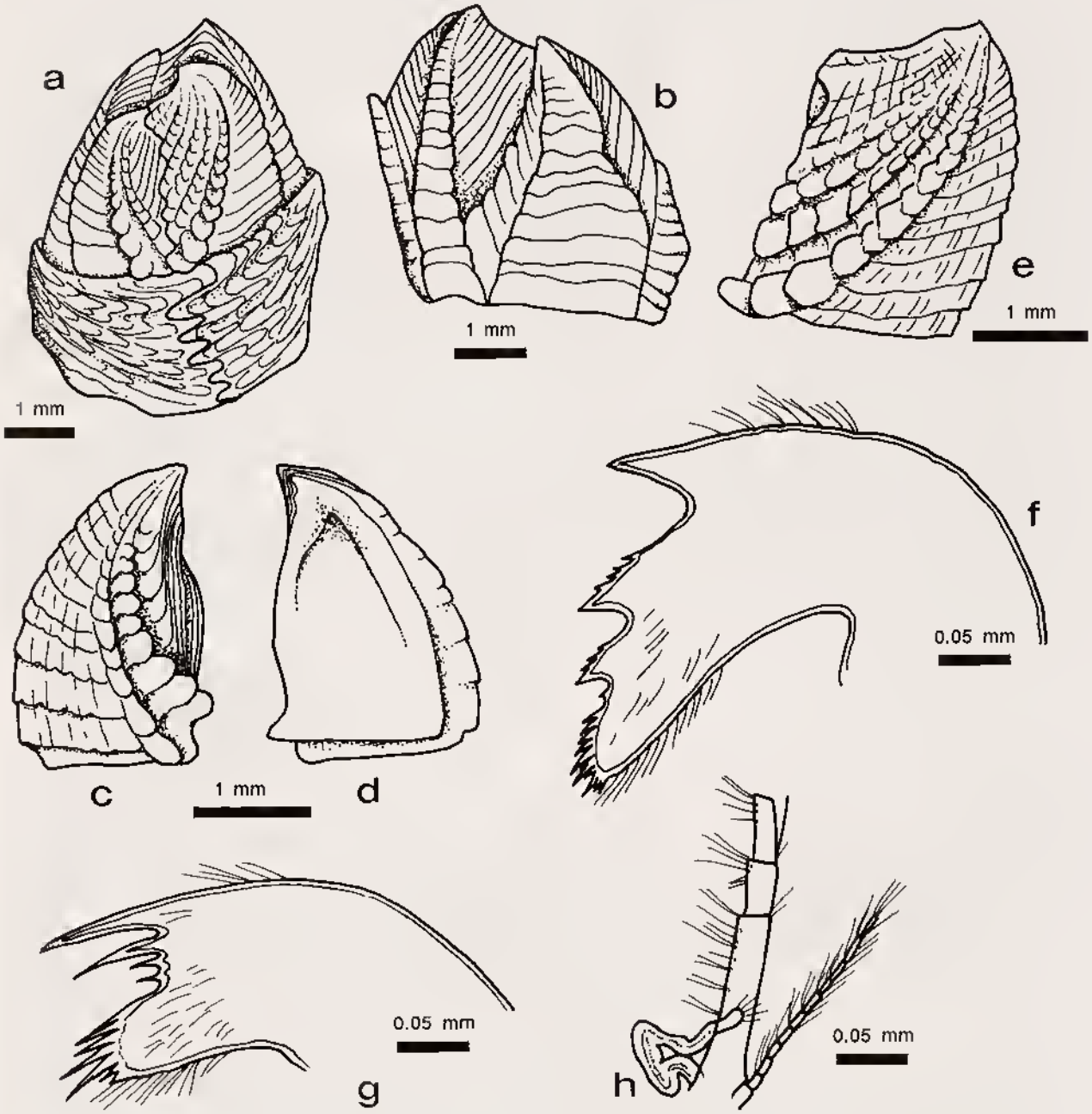

FIG. 2. — *Altiverruca cristallina* Gruvel, 1907 : **a**, complete shell (dorsal view), MNHN-Ci 2321; **b**, complete shell (fixed tergal-fixed scutal view), MNHN-Ci 2321; **c**, movable scutum (exterior); **d**, movable scutum (interior); **e**, movable tergum (exterior); **f**, mandible; **g**, first maxilla; **h**, basal portion of sixth cirrus, with penis and caudal appendage attached. All material from KARUBAR, stn CP 5.

Altiverruca galapagosa Zevina, 1987

Fig. 3 a-i

Altiverruca galapagosa Zevina, 1987 : 1814, pl. 1 figs a-h.

Source : MNHN, Paris

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn CP 17, 20°34.54'S, 167°24.68'E, 3680 m, 14.08.1985 2 specimens (MNHN-Ci 2322). — Stn DW 46, 22°53.05'S, 167°17.08'E, 570 m, 30.08.1985 : 3 specimens.

DIAGNOSIS. — *Altiverruca* with carina and rostrum interlocking with two ribs; movable scutum with one t two ribs articulating with the movable tergum; movable tergum with strong primary articulating rib plus moderately strong, distinct secondary rib; caudal appendages short.

DESCRIPTION. — Shell white, thin, compressed laterally, with regularly spaced, non-prominent growth lines rostrum and carina interlock with one rib each; apex of rostrum slightly beaked, apex of carina slightly produced rostrum with a flat triangular area extending back from the apex to the basi-scutal margin, characterised by a singl narrow rib. On the figured specimen, the rostrum arches "beneath" the carina. However this is more a function o the substrate, possibly a glass sponge spicule (removed), than a characteristic of the species.

Fixed scutum and fixed tergum with apices slightly incurved, extending a little beyond the opercular plates fixed scutum folded over on movable scutal margin, forming a zone confluent with the plane of the operculum fixed scutum overlapping the fixed tergum with a single extension.

Movable tergum quadrangular, with a strong arcuate, primary diagonal rib, plus a single, sharply rounded ridg running centrally through the scutal side to interlock with the movable scutum.

Movable scutum triangular, with two sharply rounded diagonal ribs, one of which (the more prominent interlocks at the basi-tergal angle.

Mandible tridentate, lower tooth very small to be almost confluent with lower angle; first maxilla with tw large upper spines and three small spines in the upper portion of the notch, lower angle with three large spines.

Cirrus I with rami subequal; penis moderately short, thin; caudal appendages very short. Cirri possessed th following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
3.9	8,9	7,9	14,15	18,22	18,20	14+,13+	9
6.9	8,9	10,13	22,23	26+,29+	20+,21	20+,20+	9

+ incomplete ramis

The length of the caudal appendages was slightly less than that of the basal segment of the pedicel of cirrus V on both specimens.

DISCUSSION. — *A. galapagosa* is close to *Altiverruca nitida* but may be distinguished on the basis of the singl secondary rib on the movable tergum, the short caudal appendages and the laterally compressed nature of the shell.

DISTRIBUTION. — New Caledonia, 570 to 3680 metres, Eastern Pacific, 3830-3850 metres.

Altiverruca laeviscuta sp. nov.

Fig. 4 a-h

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn DW 221, 22°46'S, 167°09'E, 535 m, 29.09.1985 1 specimen, on coral.

TYPE. — *Holotype* : MNHN-Ci 2326, rostro-carinal diameter : 3.0 mm, height : 4.6 mm, (fron MUSORSTOM 4, Stn DW 221).

DIAGNOSIS. — *Altiverruca* with movable tergum possessing two diagonal ribs; movable scutum flat, apico basal line defined by growth-line defection; caudal appendages short.

DESCRIPTION. — Shell white, with regularly spaced, non-prominent growth lines; rostrum and carina interloc with three ribs; apex of rostrum and carina produced.

Source : MNHN, Paris

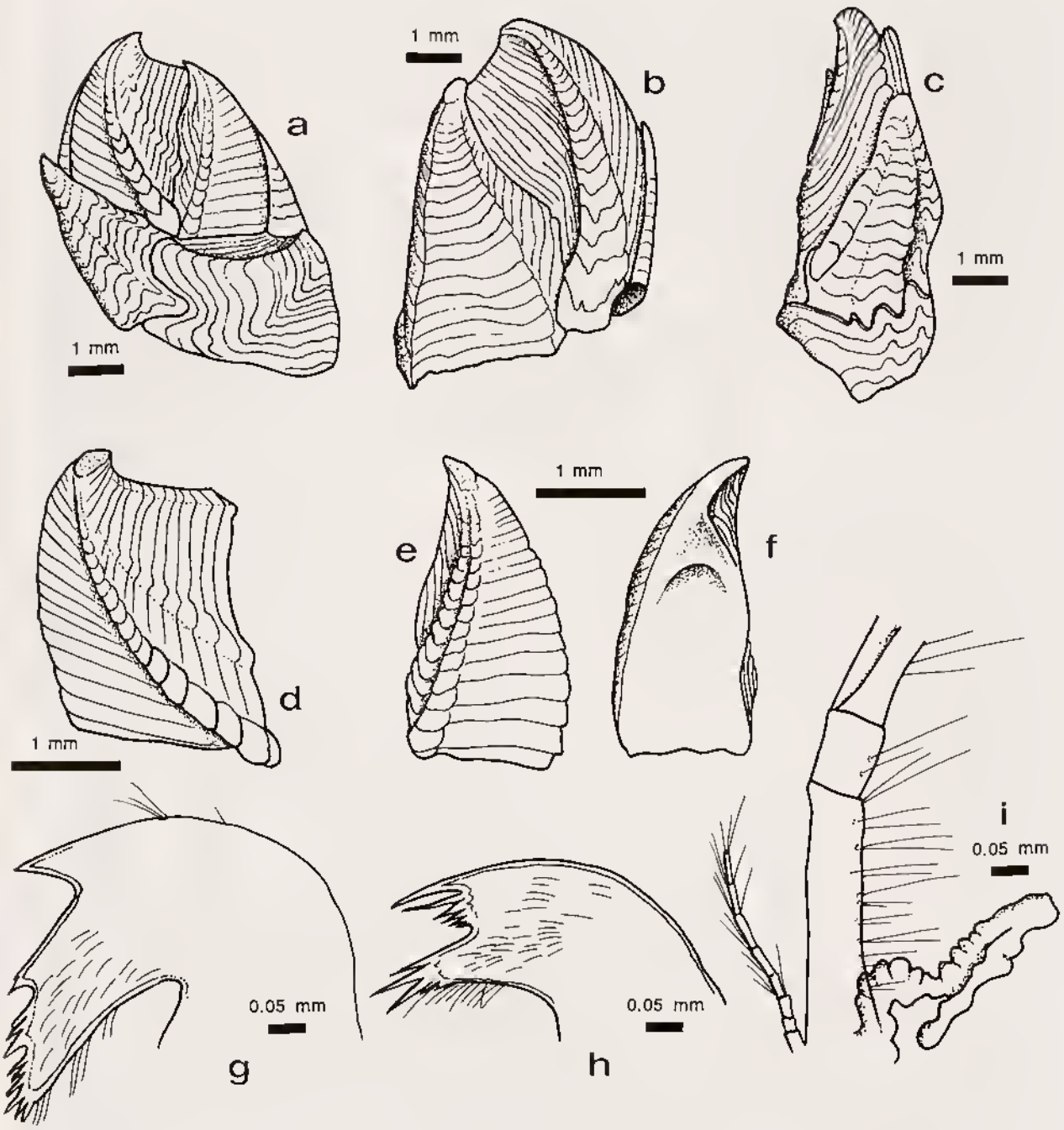

FIG. 3. — *Altiverruca galapagosa* Zevina, 1987 : **a**, complete shell (dorsal view), MNHN-Ci 2322; **b**, complete shell (fixed tergal-fixed scutal view); **c**, complete shell (rostral view); **d**, movable tergum (exterior); **e**, movable scutum (exterior); **f**, movable scutum (interior); **g**, mandible; **h**, first maxilla; **i**, basal portion of sixth cirrus, with penis and caudal appendage attached. All material from BIOCAL, stn CP 17.

Fixed scutum and fixed tergum with apices extending beyond the opercular plates; fixed scutum interlocking with the rostrum by two ribs, and folded over on its upper margin to form a surface confluent with the plane of the operculum.

Movable tergum quadrangular, with a strong, sharply rounded primary diagonal rib, plus a wide secondary rib running centrally through the scutal side.

Source : MNHN, Paris

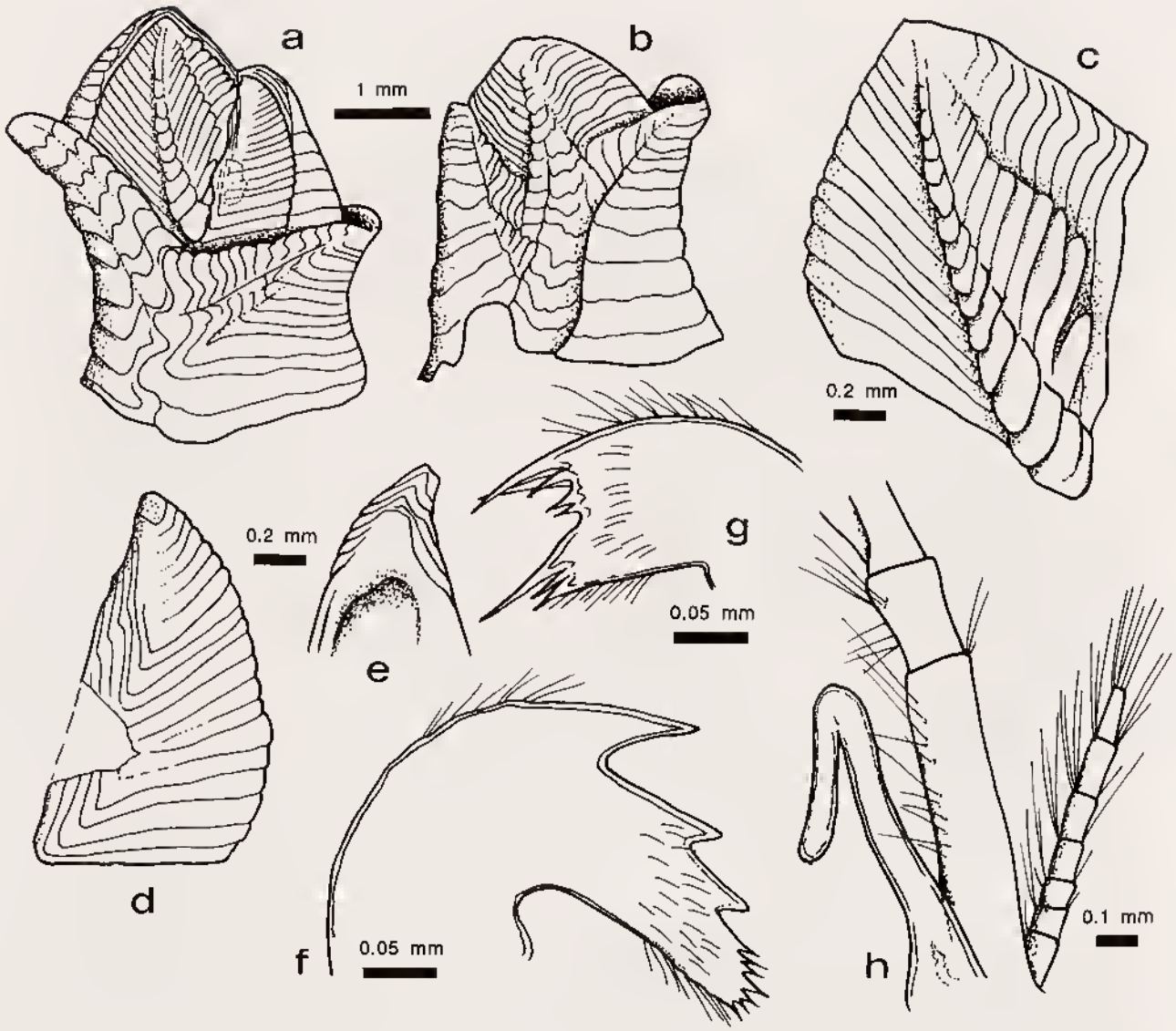

FIG. 4. — *Altiverruca laeviscuta* sp. nov. : **a**, holotype, complete shell (dorsal view), MNHN-Ci 2326; **b**, holotype (fixed tergal-fixed scutal view); **c**, movable tergum (exterior); **d**, movable scutum (exterior); **e**, apical portion of movable scutum (interior); **f**, mandible; **g**, first maxilla; **h**, basal portion of sixth cirrus, with penis and caudal appendage attached.

Movable scutum triangular, externally rather flat, apico-basal line essentially defined by growth-line defection, a further inflection on the tergal margin corresponds with a very weakly defined secondary tergal rib; interior with a moderately developed depression for the adductor muscle attachment.

Mandible tridentate, lower angle pectinate with six small spines; first maxilla with two large and one small upper spines, notch with two small spines, lower angle with one large spine and two smaller spines, hirsute.

Cirrus I with rami longer than those of cirrus II; penis short, thin; caudal appendages very short, stout. Cirri of MNHN-Ci 2326 possessed the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
3.0	10,8	7,10	14,16	19,22	23,25	24,25	7

The length of the caudal appendages was approximately equal to that of the basal segment of the pedicel of cirrus VI.

Source : MNHN, Paris

DISCUSSION. — Unfortunately only one specimen of this species has been collected, however the nature of the movable scutum is sufficiently different to warrant specific differentiation.

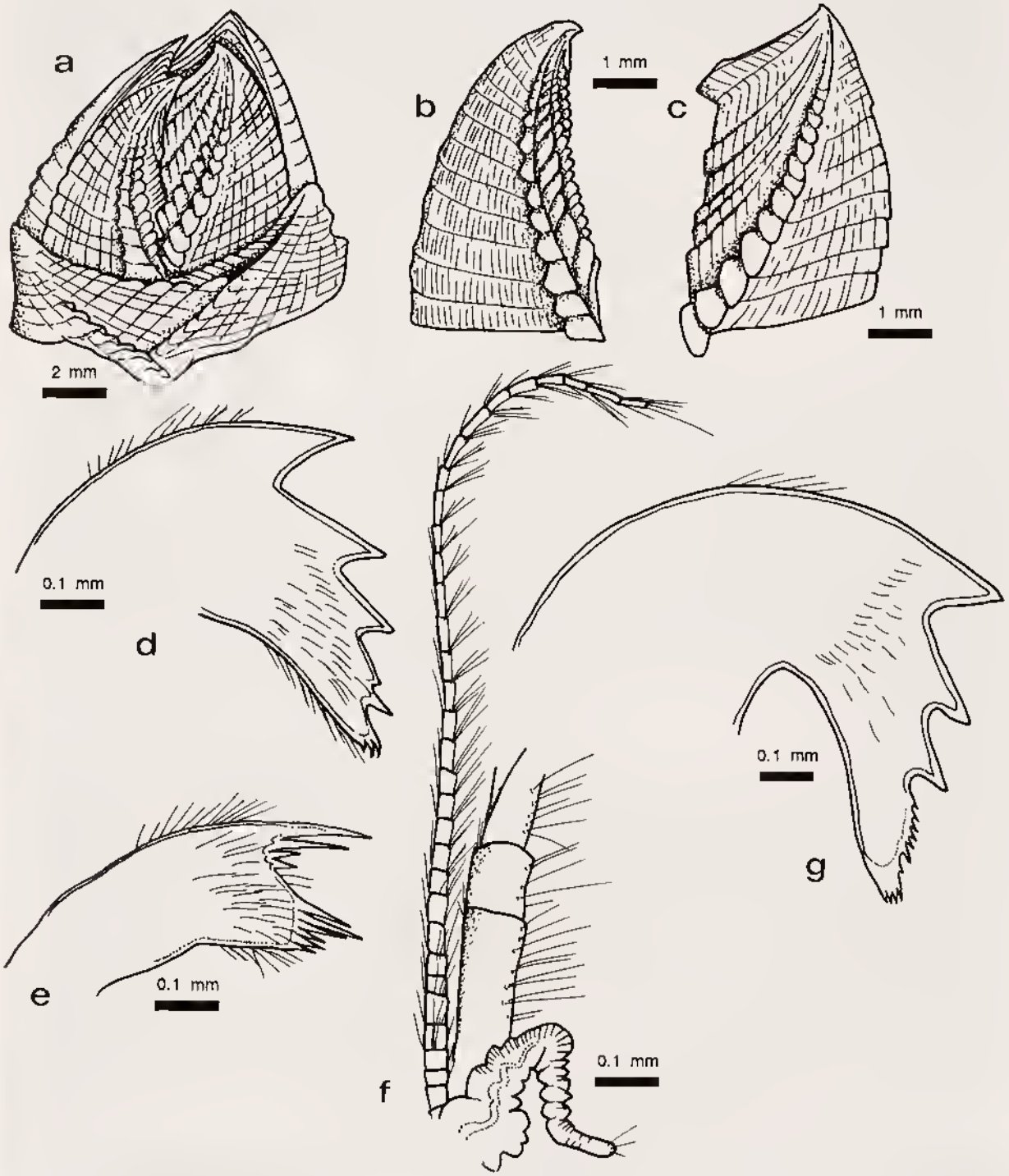

FIG. 5. — *Altiverruca navicula* (Hoek, 1913) : **a**, complete shell (dorsal view), MNHN-Ci 2328; **b**, movable scutum (exterior), MNHN-Ci 2327; **c**, movable tergum (exterior); **d**, mandible; **e**, first maxilla; **f**, basal portion of sixth cirrus, with penis and caudal appendage attached; **g**, mandible (variety), MNHN-Ci 2332. Material : a, from KARUBAR, stn CP 89; b-f, from KARUBAR, stn CP 38; g, from BIOCAL, stn CP 23.

Source : MNHN, Paris

A. laeviscuta may be distinguished from most other verrucids by the flat movable scutum. It is similar to *A. nitida* but possesses a stronger secondary rib on the movable tergum and shorter caudal appendages; it is distinguished from *A. galapagosa* by a longer rostro-carinal suture. The overall shell form, and soft part morphology, is similar to that of *Altiverruca gibbosa* (Hoek, 1883), and although *A. laeviscuta* falls into an *Altiverruca* group with *A. gibbosa*, but it may be distinguished from that species by the movable scutum (the absence of clear apico-basal ribbing), and the fixed scutum (an extra interlocking rib on the fixed tergal side on shells of similar size).

ETYMOLOGY. — Morphologic : *laevis* = smooth (Latin) + scuta.

DISTRIBUTION. — New Caledonia, 535 metres.

Altiverruca navicula (Hoek, 1913)

Fig. 5 a-g, 16 a-b

Verruca navicula Hoek, 1913 : 134, figs 4-6. — NILSSON-CANTELL, 1927 : 778, figs a-f.

MATERIAL EXAMINED. — **Indonesia**. KARUBAR : stn CC 21, 05°14'S, 133°00'E, 688-694 m, 25.10.1991 : 1 specimen, on glass sponge. — Stn CP 38, 07°40'S, 132°27'E, 620-666 m, 28.10.1991 : 1 specimen incomplete (MNHN-Ci 2327). — Stn CP 52, 08°03'S, 131°48'E, 1244-1266 m, 30.10.1991 : 2 specimens, on glass sponge. — Stn CP 87, 08°47'S, 130°49'E, 1017-1024 m, 05.11.1991 : 1 specimen. — Stn CP 89, 08°39'S, 131°08'E, 1084-1058 m, 05.11.1991 : 5 specimens (MNHN-Ci 2328), on glass sponge. — Stn CP 91, 08°44'S, 131°05'E, 884-891 m, 05.11.1991 : 21 specimens (MNHN-Ci 2331), on glass sponge.

New Caledonia. BIOCAL : stn CP 23, 22°46'S, 166°20'E, 2040 m, 28.08.1985 : 8 specimens (MNHN-Ci 2332), on glass sponge. — Stn CP 27, 23°06S, 166°26'E, 1850-1900 m, 28.08.1985 : 2 specimens, on glass sponge. — Stn CP 75, 22°18.65'S, 167°23.30'E, 825-860 m, 04.09.1985 : 1 specimen.

CHALCAL 2 : stn DW 73, 29°39.90'S, 168°38.10'E, 573 m, 29.10.1986 : 1 specimen, on corat.

Phitippines. MUSORSTOM 3 : stn 94, 13°47'S, 120°03'E, 842 m, 01.06.1985 : 1 specimen juvenile. — Stn 106, 13°47.00'S, 120°30.30'E, 668 m, 02.06.1985 : 1 specimen, on scaphopod.

DIAGNOSIS. — *Altiverruca* with carina and rostrum interlocking with single rib from each plate; movable plates large, scutum with four articular ribs, movable tergum with six articular ribs; growth lines very distinct; caudal appendages long.

DESCRIPTION. — Shetl white, large, with regularly spaced, prominent growth lines; rostrum and carina interlocking with one primary rib each, carina with a distinct furrow, running from the tergal margin to the apex, this furrow accommodates the rostral rib at the inferior end; apices of rostrum and carina slightly produced, rounded; rostrum and carina slightly wider than high.

Fixed scutum and fixed tergum lock together by several ribs.

Opercular plates large, characterised by strong growth lines and apico-basal ribs; apices extend beyond the shell wall; movable tergum quadrangular, with a strong primary diagonal rib, and up to six secondary ribs on the scutal side; movable scutum triangular, with pointed apex, primary apico-basal ridge prominent, gently arced, up to four secondary ribs articulating with the tergum.

Mandible tridentate, lower angle divided into two portions, pectinate; first maxilla with two large upper spines, hirsute notch and seven spines on lower angle.

Labrum with finely toothed crest; palps pointed.

Cirrus I with inner ramus longer than that of cirrus II; inner ramus of cirrus II bluntly terminated; penis long, prosbosciform, terminally hirsute; caudal appendages very long. Cirri possessed the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
8.4	11,19	8,19	20,22	23,25	22,26	27,28	31
10.7	15,25	9,24	22,25	30,33	32,34	31,34	28

Source : MNHN, Paris

Of the specimens examined, the length of the caudal appendages was a little more than twice that of the basal segment of the pedicel of cirrus VI.

DISCUSSION. — The number of interlocking ribs between rostrum and carina can be somewhat confusing. In *A. navicula*, there is one primary rib, and this is so dominant that other ribs may go unnoticed; on some of the larger specimens (e.g. > 10 mm diameter), the very base of the suture between carina and rostrum becomes sinuous, the effect being an extension of one or two very weak apico-basal ridges. If these were stronger, they would be termed interlocking ribs. The difference between these ridges and ribs is far less clear in *A. cristallina*, where up to six interlocking ribs have been observed.

Some variation in the mandible has also been observed, with the lower angle having either a distinct spine (fig. 5 d) or being evenly pectinate (fig. 5 g). Of these, fig. 5 d is at variance with NILSSON-CANTELL's original description and it is likely that the extra spine is a result of damage and subsequent repair.

The minimum depth of this species has been reduced by approximately 400 metres.

DISTRIBUTION. — Tropical Pacific, 573 to 2745 metres.

Altiverruca nitida (Hoek, 1883)

Fig. 6 a-g

Verruca nitida Hoek, 1883 : 138, figs 6, 7. — GRUVEL, 1905 : 177, fig. 194. — NILSSON-CANTELL, 1927 : 778.

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn CP 23, 22°46'S, 166°20'E, 2040 m, 28.08.1985 : 1 specimen. — Stn CP 29, 23°08'S, 166°40'E, 1100 m, 29.08.1985 : 7 specimens, on pebbles. — Stn CP 30, 23°09'S, 166°41'E, 1140 m, 29.08.1985 : 7 specimens, on gastropods and pebbles. — Stn DW 36, 23°09'S, 167°11'E, 650-680 m, 29.08.1985 : 1 specimen, on coral.

Chesterfield Islands. MUSORSTOM 5 : stn CP 323, 21°18.52'S, 157°57.62'E, 970 m, 14.10.1986. 2 specimens, (MNHN-Ci 2329), on coral. — Stn CP 324, 21°15.01'S, 157°51.33'E, 970 m, 14.10.1986 : 3 specimens, on coral.

Wallis and Futuna Islands. MUSORSTOM 7: stn CP 567, 11°47.0'S, 178°27.3'W, 1010-1020 m, 20.05.1992 : 1 specimen, on pebble. — Stn CP 621, 12°35.0'S, 178°11.5'W, 1280-1300 m, 28.05.1992 : 14 specimens, on glass sponge. — Stn CP 622, 12°34.5'S, 178°10.9'W, 1280-1300 m, 28.05.1992 : 18 specimens, on glass sponge. — Stn CP 623, 12°34.2'S, 178°15.1'W, 1280-1300 m, 28.05.1992 : 2 specimens, on glass sponge. — Stn DW 635, 13°49.0'S, 179°56.0'E, 700-715 m, 30.05.1992 : 1 specimen, on coral.

DIAGNOSIS. — *Altiverruca* with carina and rostrum interlocking with two ribs; movable scutum with two ribs articulating with one strong diagonal rib of the movable tergum; caudal appendages long.

DESCRIPTION. — Shell white, with regularly spaced, non prominent growth lines; rostrum and carina interlock with two main ribs; apices of rostrum and carina slightly produced.

Fixed scutum and fixed tergum with apices extending well beyond the opercular plates; interlocking with a single rib; fixed scutum "folded over" on its upper margin to form a surface confluent with the plane of the operculum.

Movable tergum quadrangular, with a strong primary diagonal rib, plus a low, broadly rounded, weak ridge on the scutal side; upper margin shorter than basal margin, but with a rounded extension that locks in behind the movable scutum.

Movable scutum triangular, with two diagonal ribs, the more prominent interlocking with the rostrum at the basi-tergal angle.

Mandible tridentate, lower angle pectinate with seven small spines; first maxilla with two large upper spines, notch hirsute, lower angle hirsute, with three spines.

Cirrus I with inner ramus longer than that of cirrus II; penis long, probosciform, terminally hirsute; caudal appendages very long. Cirri possessed the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
8.3	12,21	10,24	24,28	28,29	30,32	30,36	35

Source : MNHN, Paris

Of the specimens examined, the length of the caudal appendages was approximately five times that of the basal segment of the pedicel of cirrus VI.

DISCUSSION. — *A. nitida* is related to *A. navicula*, and can be included within a group of *Altiverruca* characterised by few interlocking ribs between rostrum and carina, opercular plates each with a prominent apicobasal ridge and long caudal appendages; as such juveniles of both species may appear similar. The bathyal range of this species has been extended by approximately 1000 metres.

DISTRIBUTION. — Tropical western Pacific, 650 to 2040 metres.

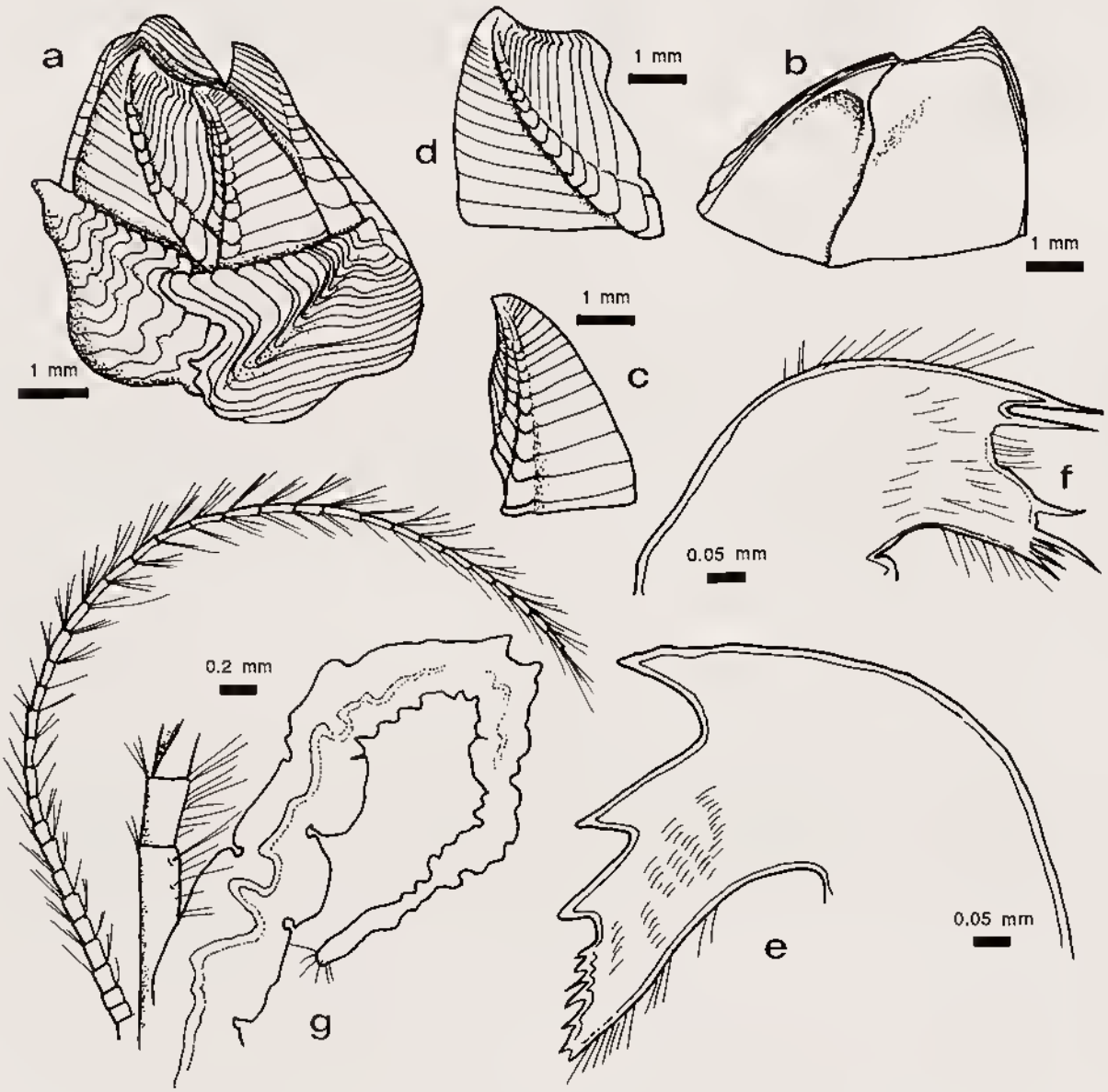

FIG. 6. — *Altiverruca nitida* (Hoek, 1883) : **a**, complete shell (dorsal view), MNHN-Ci 2329; **b**, articulated movable scutum and tergum (interior); **c**, movable scutum (exterior); **d**, movable tergum (exterior); **e**, mandible; **f**, first maxilla; **g**, basal portion of sixth cirrus, with penis and caudal appendage attached. All material from MUSORSTOM 5, stn CP 323.

Source : MNHN, Paris

Genus *CAMERAVERRUCA* Pilsbry, 1916

Verruca "Section C": *Cameraverruca* Pilsbry, 1916 : 39.
Verruca (Cameraverruca) - FOSTER, 1978 : 68.
Cameraverruca - ZEVINA, 1978 : 1813.

DIAGNOSIS. — Verrucids with shell moderately erect; apical cavities of fixed tergum and rostrum partitioned off, forming a recess in the general cavity; myophore present on movable scutum.

TYPE. — *Verruca euglypta* Pilsbry, 1908 : 108. Florida, 805 metres.

SPECIES. — 3 species are presently attributed to this genus: the type,*Verruca euglypta* Pilsbry, 1908, *Cameraverruca radiata* (Gruvel, 1900), Canary Islands, and *Cameraverruca nodiscuta* sp. nov., New Caledonia.

DISCUSSION. — Amongst the features used by PILSBRY (1916) to define *Cameraverruca* were the erectness of the shell and the presence of a myophore on the fixed scutum. In *C. euglypta*, the myophore was described as "vertical, partition-like". The terminology "vertical" is at first instance confusing, fortunately however, the interior of the fixed scutum is figured in PILSBRY (1916, pl. 3, fig. 2a) where, although the myophore is shown to be vertically depending, it is aligned horizontally, and is thus similar to other myophores in other *Cameraverruca* and *Metaverruca*. The term "erect" may also lead to confusion : *C. nodiscuta* sp. nov. and *C. radiata* are not as erect as most *Altiverruca* species, but are certainly more erect than those of *Metaverruca* and *Verruca*.

I have also had an opportunity to examine GRUVEL's types of *V. radiata* and confirm that this possesses both an "erect" shell and a myophore on the fixed scutum.

STRATIGRAPHIC RANGE. — Recent.

DISTRIBUTION. — Atlantic and western Pacific, 380 - 912 metres.

Cameraverruca nodiscuta sp. nov.

Fig. 7 a-j

MATERIAL EXAMINED. — **Chesterfield Islands.** MUSORSTOM 5 : stn DW 300, 22°48.27'S, 159°23.94'E, 450 m, 11.10. 1986 : 1 specimen, on corat.
Loyalty Islands. MUSORSTOM 6 : stn DW 397, 20°47.35'S, 167°05.17'E, 380 m, 12.02.1989 : 2 specimens.

TYPES. — *Holotype* : MNHN-Ci 2315, r-c diameter : 4.5 mm, height : 6.6 mm, (from MUSORSTOM 5, Stn DW 300).
Paratypes : MNHN-Ci 2316-2317, (from MUSORSTOM 6, Stn DW 397).

DIAGNOSIS. — *Cameraverruca* with carina and rostrum interlocking with up to six ribs; movable scutum with three articulating ribs, the uppermost extended, node-like; fixed scutum with semicircular, upwardly concave myophore; caudal appendages short.

DESCRIPTION. — Shell off-white to palest pink, with regularly spaced, non prominent growth lines; carina and rostrum interlocking with up to six ribs, apex of carina and rostrum slightly produced; rostrum with apical cavity weakly partitioned off; base of plates thickened, slightly inflected; carina and fixed tergum interlocking with three ribs; rostrum and fixed scutum interlocking with four ribs; basis calcareous.

Fixed scutum and fixed tergum with apices extending beyond the opercular plates, both folded over on their opercular margins to form a zone confluent with the plane of the operculum; fixed scutum with semicircular, upwardly concave myophore; fixed tergum with apical cavity clearly partitioned off, forming a recess in the general cavity.

Source : MNHN, Paris

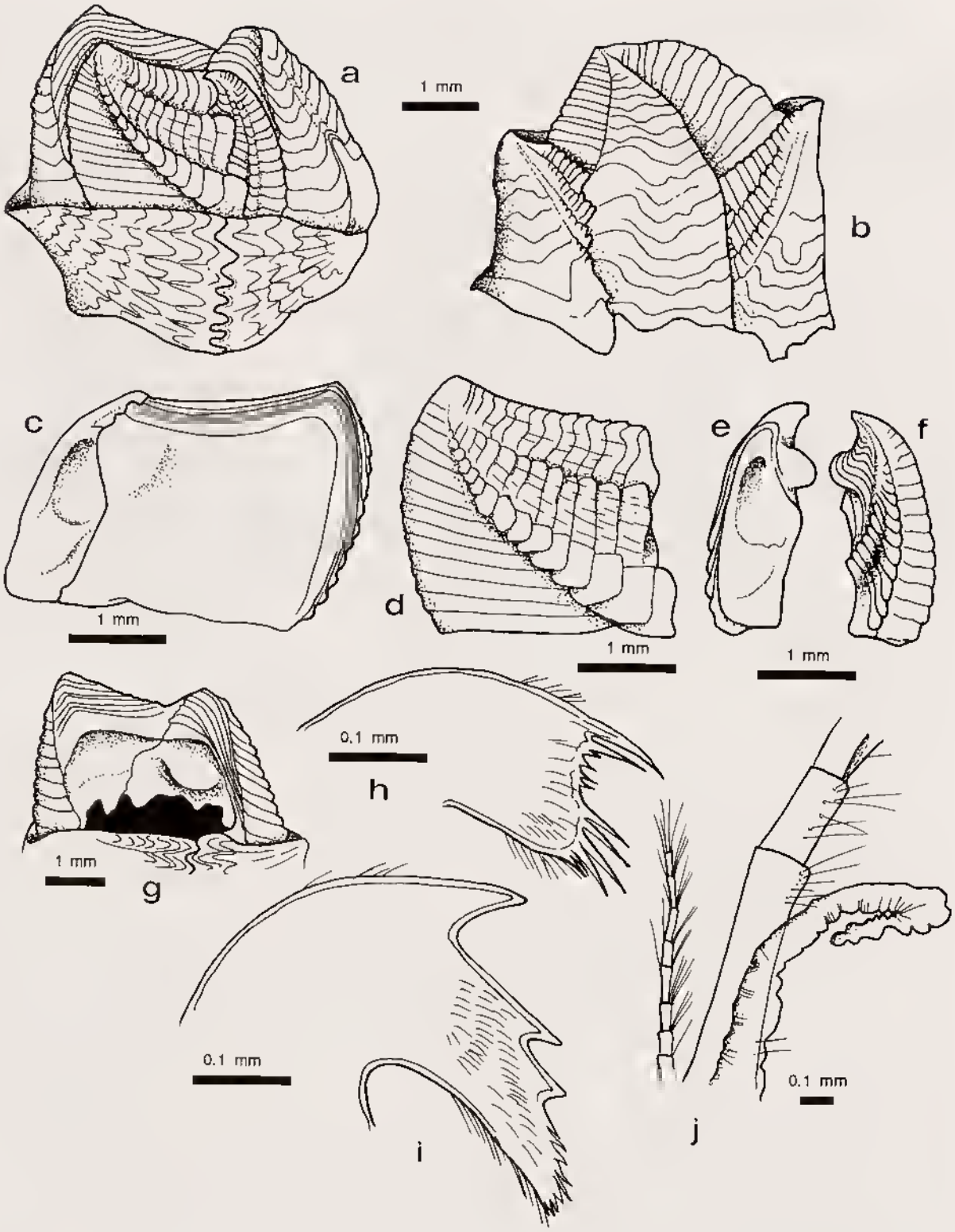

FIG. 7. — *Cameraverruca nodiscuta* sp. nov. : **a**, holotype, complete shell (dorsal view), MNHN-Ci 2315; **b**, holotype, complete shell (fixed tergal-fixed scutal view); **c**, articulated movable scutum and tergum (interior); **d**, movable tergum (exterior); **e**, movable scutum (interior); **f**, movable scutum (exterior); **g**, interior of holotype shell, showing pendant myophore on fixed scutum; **h**, first maxilla; **i**, mandible; **j**, basal portion of sixth cirrus, with penis and caudal appendage attached. All material from MUSORSTOM 5, stn DW 300.

Source : MNHN, Paris

Movable scutum rather narrow, triangular, with a moderately strong, arcuate, apico-basal ridge interlocking at the basi-tergal angle with the movable tergum, two further ribs articulate with the movable tergum, the uppermost of which is extended and node-like, to slot in between the second and third ribs on the tergum, interior with moderatly deep adductor muscle pit.

Movable tergum with a strong apico-basal rib, plus a moderately strong and distinct secondary rib; scutal side further characterised by weak longitudinal striae; interior smooth except for a narrow zones of growth lines on upper and fixed tergal margins.

Mandible tridentate, lower angle pectinate; first maxilla with two strong upper spines, three smaller spines in the notch and four spines on an hirsute lower angle.

Cirrus I with anterior ramus longer, cirrus II with posterior ramus longer; penis thin, probosciform, about twice the length of the basal segment of the pedicel of cirrus VI; caudal appendages short, slightly less than that of the basal segment of the pedicel of cirrus VI. Cirri possessed the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
4.5	12,9	9,12	15,16	15,20	21,22	21,21	8

DISCUSSION. — *C. nodiscuta* may be distinguished from other *Cameraverruca* by the narrow, nodose scutum. It extends the geographic range of the genus from the Atlantic to the Pacific Ocean.

ETYMOLOGY. — Morphologic : from *nodus* = node (Latin) + scuta.

DISTRIBUTION. — New Caledonia, 380 to 450 metres.

Genus *BROCHIVERRUCA* Zevina, 1993

DIAGNOSIS. — Verrucids with apex (umbo) of both carina and rostrum removed from the margin of the plates; fixed scutum with or without a myophore.

TYPE. — *Brochiverruca margulisae* Zevina, 1993 : 10. Mozambique Channel, Indian Ocean, 935-950 metres.

SPECIES. — Three species are here attributed to this genus, the type, *Brochiverruca margulisae* Zevina, *Brochiverruca dens* (Broch) and *Brochiverruca polystriata* sp. nov., New Caledonia.

DISCUSSION. — BROCH (1932) included *B. dens* within *Rostratoverruca*, on the basis that it was most closely allied to taxa within that group. The inclusion however was tentative, and BROCH suggested that future investigations may warrant separation of the species from *Rostratoverruca*. Certainly the nature of the rostrum and carina and the cubic, "tooth-like" appearance make *Brochiverruca* one of the most easily distinguished verrucid genera. It is considered likely that future workers may wish to further divide *Brochiverruca*, particularly on the basis of the presence of a myophore on the fixed scutum of the new species. At this juncture, I consider the placement of these species within *Brochiverruca*, based on the similarity of overall shell morphology, to be a tentative solution to the problem.

STRATIGRAPHIC RANGE. — Recent.

DISTRIBUTION. — Western Pacific and Western Indian Ocean, 348-950 metres.

Brochiverruca dens (Broch, 1932)

Verruca (Rostratoverruca?) dens Broch, 1932 : 47, fig. 17 a-g.

MATERIAL EXAMINED. — **Indonesia**. KARUBAR : stn CP 69, 08°42'S, 131°53'E, 356-368 m, 02.11.1991 : 3 specimens without opercula and soft parts, on coral.

Source : MNHN, Paris

DIAGNOSIS. — Shell white, finely sculptured with delicate longitudinal striae crossed by fine, distinct, growth lines; rostrum and carina each with the apex separated from the upper margin by one third the distance from the basal margin; fixed scutum without a myophore.

DESCRIPTION. — Shell white, tooth-like, exterior very finely sculptured with delicate longitudinal striae crossed by distinct, but not prominent growth lines.

Rostrum and carina each with the apex separated from the upper margin by one third the distance from the basal margin; the margin between both plates is characterised by up to 13 fine, non-prominent, articulating ribs. Fixed scutum without a myophore. Soft parts and operculum absent from this collection.

In his original description, BROCH noted that this species possessed a broad, trapezoid movable tergum, with up to 12 delicate ribs articulating with the movable scutum; the movable scutum is about half the width of the tergum, internally with a shallow adductor muscle scar. Of the soft parts, it is significant to note that the labrum is smooth, and the palps short and narrow; *B. dens* is characterised by a relatively "stout penis, a little longer than the caudal appendages", which themselves are long, having 25 segments (about half as long as the sixth cirrus).

DISCUSSION. — This species often has a surface texture closely approximating that of the substrate. A large specimen from KARUBAR, Stn CP 69, with a rostro-carinal diameter of 6.8 mm, attached to a smooth surfaced stylasterid coral, showed little evidence of the normally characteristic fine sculpture. The specimen however, was represented by a shell wall only, and may have been subsequently modified by the coral and/or the physical environment.

DISTRIBUTION. — Western Pacific, 348-368 metres.

Brochiverruca polystriata sp. nov.

Fig. 8 a-j

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn DW 51, 23°05.27'S, 167°44.95'E, 700 m, 31.08.1985 : 1 specimen with opercula and soft parts absent, on *Ellanospammia*. — Stn DW 66, 24°55.43'S, 168°21.67'E, 510 m, 03.09.1985 : 1 specimen juvenile.

CHALCAL 2 : stn DW 77, 23°38.35'S, 167°42.68'E, 435 m, 30.10.1986 : 13 specimens, most without opercula and soft parts, on coral.

TYPES. — *Holotype* : MNHN-Ci 2292, rostro-carinal diameter : 4.3 mm, height : 4.5 mm, (from CHALCAL 2, Stn DW 77).

Paratypes : MNHN-Ci 2293, (from BIOCAL, Stn DW 66), MNHN-Ci 2294-2297 (from CHALCAL 2, Stn DW 77); UNITEC Cat. No. CAX 101, (from CHALCAL 2, Stn DW 77); USNM (from CHALCAL 2, Stn DW 77).

DIAGNOSIS. — Shell finely sculptured with delicate longitudinal striae crossed by growth lines to give a finely nodose surface texture; rostrum and carina each with the apex separated from the upper margin by slightly less than a third the distance from the basal margin; fixed scutum with myophore.

DESCRIPTION. — Shell white, tooth-like, exterior finely sculptured with numerous delicate longitudinal striae crossed by distinct growth lines with a resultant nodose effect.

Rostrum and carina each with the apex separated from the upper margin by slightly less than one third the distance from the basal margin; the margin between both plates is characterised by up to 21 fine, non-prominent, articulating ribs.

Fixed scutum protruded along rostral margin to form a covered portion on the upper surface adjacent to the movable scutum; articulating with the fixed tergum with up to seven delicate ribs, and with the rostrum with up to 13 ribs; with a clear lunulitiform myophore on inner surface (Fig. 8f); fixed tergum and carina articulating with up to seven ribs.

Source MNHN, Paris

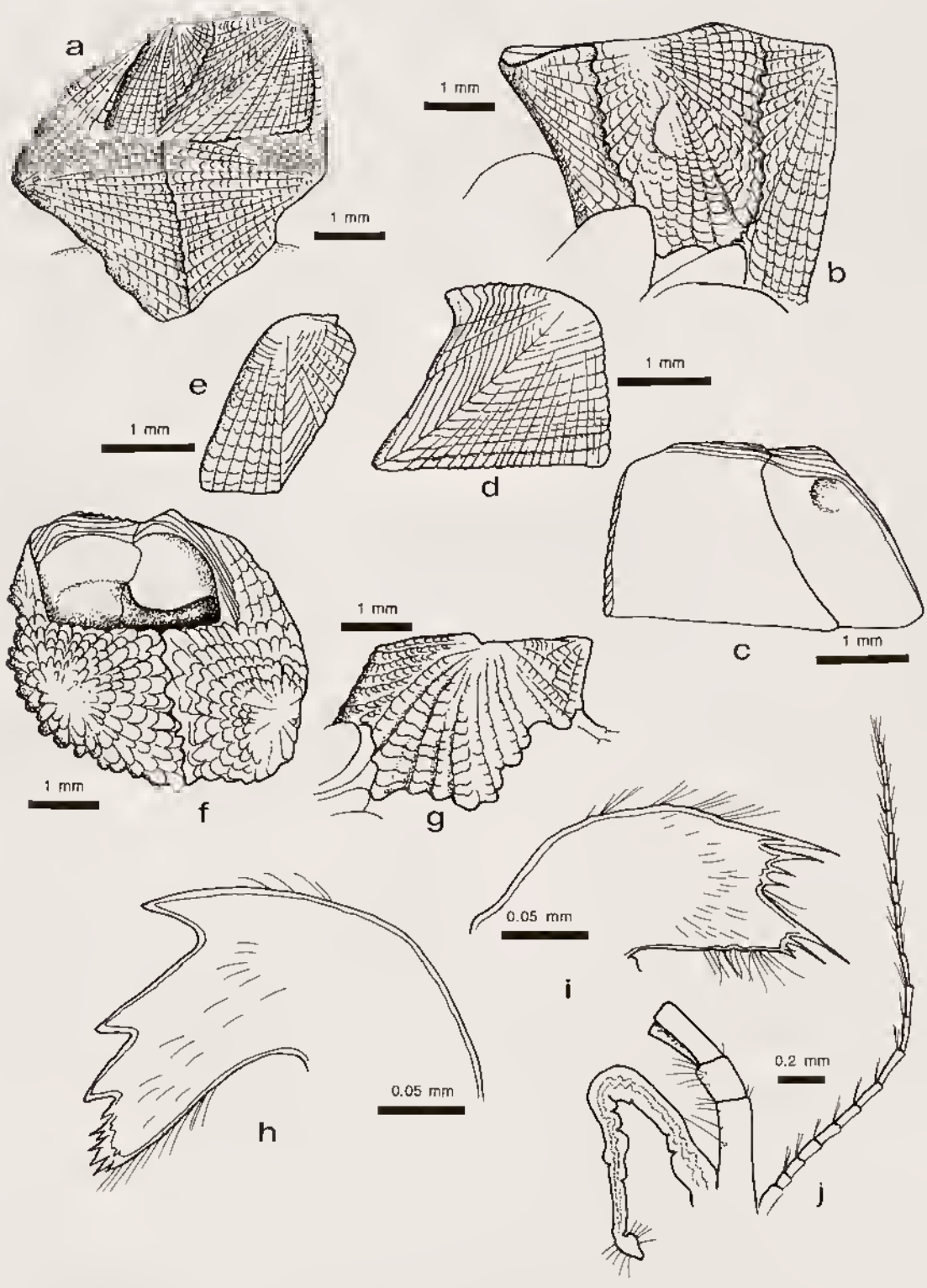

FIG. 8. — *Brochiverruca polystriata* sp. nov. : **a**, holotype, complete shell (dorsal view), MNHN-Ci 2292; **b**, holotype, complete shell (fixed tergal-fixed scutal view); **c**, articulated movable scutum and tergum (interior); **d**, movable tergum (exterior); **e**, movable scutum (exterior); **f**, shell with opercula removed, showing pendant myophore on fixed scutum; **g**, complete shell (fixed tergal-fixed scutal view); **h**, mandible; **i**, first maxilla; **j**, basal portion of sixth cirrus, with penis and caudal appendage attached. Material : a-e, from CHALCAL 2, stn DW 77; f-g, from BIOCAL, stn DW 51; h-j, from BIOCAL, stn DW 66.

Source : MNHN, Paris

Movable tergum of low relief, quadrangular to kite shaped, with up to seven narrow, delicate ribs articulating with the movable scutum.

Movable scutum quadrangular, less than half the width of the tergum, with a weak apico-basal ridge and five to six very weak ribs articulating with the movable tergum; interior with shallow adductor muscle depression positioned immediately below the apical growth lines.

Mandible tridentate, lower angle pectinate; first maxilla with two larger spines above the notch and four spines on the lower part; penis long and relatively stout basally, at least twice the length of the caudal appendages, terminally hirsute. Cirri with subequal rami, with the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
2.6	8,6	6,7	10,13	14,16	17,19	19,20	9
4.3	11,11	8,10	12,13	15,17	15,19	20,20	8

Of the three specimens examined, the length of the caudal appendages was about twice that of the basal segment of the pedicel of cirrus VI.

Living material from CHALCAL 2, Stn 77 included shells with a pale pink colouration, but this disappeared when the darkish soft parts were removed.

DISCUSSION. — When this material was first encountered, I identified it tentatively as *Verruca (Rostratoverruca?) dens* Broch; the nature of the apices of the rostrum and carina being considered rather diagnostic. The presence of a myophore on the fixed scutum, plus the surface texture, however marks this form as distinct. In his original description of *V. dens*, BROCH did not observe a myophore. The possibility that the myophore may have been lost, or reduced during growth, was considered, and in this instance further specimens of *V. dens* were studied. (MNHN-Ci 2154 : from La Réunion). These specimens did not possess a myophore on the fixed scutum. Further differences in the soft parts (see below), strengthened this as a distinct species.

Clearly this species is most closely related to *B. dens*, but may be distinguished by a slightly coarser external texture, the scutal myophore, the significantly shorter caudal appendages and the longer penis (It has been noted in BARNES (1992) however, that the length of the penis in some species may be related to the breeding condition).

ETYMOLOGY. — Morphologic : *poly* + *striatus* = many + striae (Latin).

DISTRIBUTION. — New Caledonia, 435-700 metres.

Genus *METAVERRUCA* Pilsbry, 1916

Verruca "Section A": *Metaverruca* Pitsbry, 1916 : 21.
Verruca (Metaverruca) · FOSTER, 1978 : 68.
Metaverruca · ZEVINA, 1978 : 1812.

DIAGNOSIS. — Verrucids with apices of carina and rostrum marginal; fixed scutum with myophore; operculum parallel to base; base inflexed, thickened.

TYPE. — *Verruca coraliophila* Pilsbry, 1916 : 21. Between Bahamas and Cape Fear, 506-794 metres.

SPECIES. — Eight species are presently attributed to this genus, this includes a revised *Metaverruca recta* (within which *Verruca capsula* Hock, 1913; *Verruca coraliophila* Pilsbry, 1916; *Verruca hatotheca* Pilsbry, 1907; *Verruca linearis* Gruvel, 1900; *Verruca magna* Gruvel, 1901; *Verruca sculpta* Aurivillius, 1898, are synonymised), *Metaverruca corrugata* Broch, 1922, *Metaverruca lepista* Zevina, 1987, *Metaverruca seriola* Zevina, 1987, plus the four new species described here : *Metaverruca defayeae* sp. nov., *Metaverruca norfolkensis* sp. nov., *Metaverruca pacifica* sp. nov., and *Metaverruca plicata* sp. nov.

STRATIGRAPHIC RANGE. — Lower Miocene (New Zealand) to Recent.

Source : MNHN, Paris

DISTRIBUTION. — Cosmopolitan, 167- 4100 metres.

Metaverruca defayeae sp. nov.

Fig. 9 a-g

MATERIAL EXAMINED. — **Volcanoes south of Vanuatu.** VOLSMAR : stn DW 55, 20°59.20'S, 170°01.90'E, 710 m, 5.07.1989 : 1 specimen.

Loyalty Islands. MUSORSTOM 6 : stn DW 468, 21°05.86'S, 167°32.98'E, 600 m, 22.02.1989 : 1 specimen. — Stn DW 480, 21°08.50'S, 167°55.98'E, 380 m, 22.02.1989 : 1 specimen, on pebble. — Stn DW 486, 20°21.40'S, 167°47.65'E, 370 m, 23.02.1989 : 1 specimen, on gastropod.

Wallis and Futuna Islands. MUSORSTOM 7 : stn DW 537, 12°30'S, 176°41'W, 325-400 m, 16.05.1992 : 1 specimen, on pebble. — Stn DW 540, 12°26.7'S, 177°28'W, 600 m, 17.05.1992 : 1 specimen, on pebble. — Stn DW 541, 12°27'S, 177°28'W, 500-505 m, 17.05.1992 : 1 specimen, on pebble. — Stn DW 547, 12°26'S, 177°26'W, 455 m, 17.05.1992 : 1 specimen, on pebble. — Stn DW 586, 13°11'S, 176°13'W, 510-600 m, 22.05.1992 : 1 specimen, on pebble. — Stn DW 594, 12°31'S, 174°20'W, 510-600 m, 24.05.1992 : 1 specimen, on pebble. — Stn DW 604, 13°21'S, 176°08'W, 415-420 m, 26.05.1992 : 1 specimen, on coral.

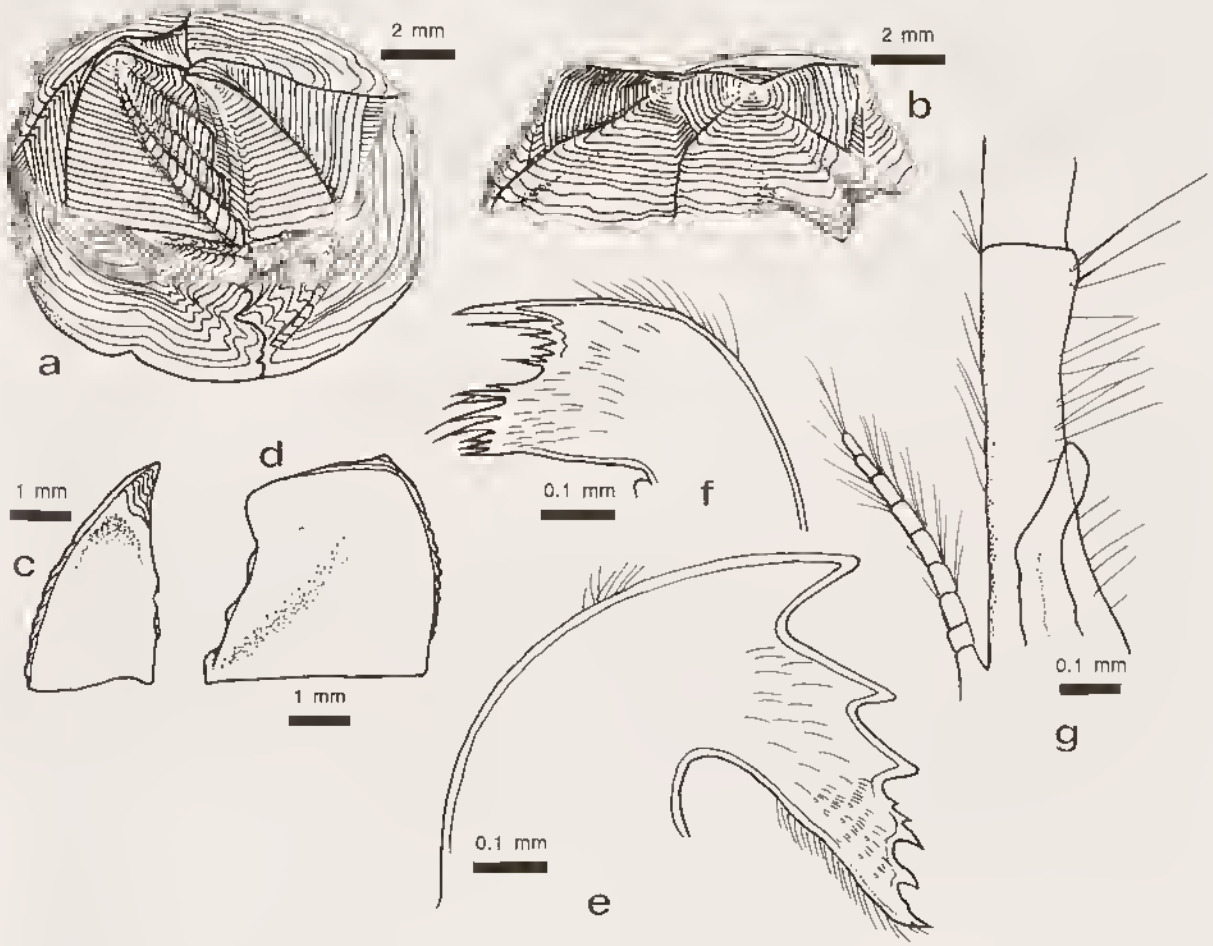

FIG. 9. — *Metaverruca defayeae* sp. nov. : **a**, holotype, complete shell (dorsal view), MNHN-Ci 2298; **b**, holotype, complete shell (fixed tergal-fixed scutal view); **c**, movable scutum (interior); **d**, movable tergum (interior); **e**, mandible; **f**, first maxilla; **g**, basal portion of sixth cirrus, with penis and caudal appendage attached. Material : a-d, from VOLSMAR, stn DW 55; e-g, from MUSORSTOM 7, stn DW 537.

TYPES. — *Holotype* : MNHN-Ci 2298, rostro-carinal diameter : 10.4 mm, height : 3.4 mm, (from VOLSMAR, Stn DW 55).

Source : MNHN, Paris

Paratypes : MNHN-Ci 2299, (from MUSORSTOM 7, Stn DW 537); MNHN-Ci 2300, (from MUSORSTOM 7, Stn DW 540); UNITEC Cat. No. CAX 102, (from MUSORSTOM 7, Stn DW 541); USNM, (from MUSORSTOM 7, Stn DW 547).

DIAGNOSIS. — A large *Metaverruca* with movable tergum and scutum having four articular ribs; exterior smooth with closely spaced growth lines; mandible quinquedentate, caudal appendages short, less the length of the basal segment of the pedicel of cirrus VI.

DESCRIPTION. — Large sized *Metaverruca* with shell white, low conic, sides steep; operculum sub-parallel to base, orifice D-shaped; exterior generally smooth, with relatively closely spaced, concentric growth lines; rostrum and carina articulating with up to five ribs; basis membranous.

Fixed scutum with a well formed myophore for adductor muscle attachment; basal margin of shell thickened and inflected on larger specimens; fixed tergum a little less than the width of fixed scutum, with basal margin thickened and inflected on larger specimens.

Movable tergum quadrangular, with a well defined apico-basal rib, and three secondary ribs, interlocking with the movable scutum.

Movable scutum triangular, relatively narrow, with three closely spaced ribs interlocking with the tergum and a further adjacent apico-basal rib terminating at the rostro-carinal suture; internally with a weak depression for adductor muscle attachment; both opercular plates together form a slightly convex rostro-carinal hinge.

Mandible quinquedentate, last tooth very small, lower angle hirsute, with one main spine; first maxilla with two large upper spines, notch with four small spines, lower angle hirsute, with five spines.

Cirri particularly fine, possessing the following number of segments (r-c being the rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
8.3	14,13	10,14	23,25	27,30	33,33	31,33	8
10.4	14,12	21,25	23,26	32,33	27,34	23+,30+	7
11.8	17,15	13,14	17,21	27,28	28,29	27,31	9

+ incomplete ramis

The caudal appendages are very short and thin, with length a little less than that of the basal segment of the pedicel of cirrus VI; penis vestigial.

The soft parts of larger specimens possessed a distinct pink coloration, particularly in the vicinity of the mouthparts.

DISCUSSION. — *M. defayeae* is very close to *M. recta*, differing essentially in the number of ribs present on the opercular plates. However, in all specimens studied, the spacing of the growth lines was also found to be distinct, being arranged closer in *M. defayeae*. At first it appeared that these two factors may fall within the morphological range of *M. recta*, with growth line spacing being a function of growth rate (and thus environment). However this is less likely to be the case as both species have been recorded from the same station. The soft parts also assist in distinguishing this species, particularly in respect of the mandible, which has five teeth, (although the fifth is rather small), this character has not been encountered in any other verrucids studied in the collections. Further, unlike *M. recta*, the rami of cirrus II are either longer or equal to those of cirrus I.

ETYMOLOGY. — Named for Dr Danielle DEFAYE, Muséum national d'Histoire naturelle, Paris, for her assistance during this research project.

DISTRIBUTION. — Western Pacific, 370-710 metres.

Metaverruca norfolkensis sp. nov.

Fig. 10 a-k

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn CP 29, 23°08'S, 166°40'E, 1100 m, 29.08.1985 : 1 specimen, on pumice.

SMIB 5 : stn DW 93, 22°20.00'S, 168°42.30'E, 255 m, 11.09.1989 : 1 specimen.

Source : MNHN, Paris

TYPES. — *Holotype* : MNHN-Ci 2301, rostro-carinal diameter : 4.1 mm, height : 1.8 mm, (from BIOCAL, Stn CP 29).

Paratype : MNHN-Ci 2302, (from SMIB 5, Stn DW 93).

DIAGNOSIS. — A medium size *Metaverruca* with movable tergum and scutum having four articular ribs; exterior smooth with moderately spaced growth lines; caudal appendages short, less the length of the basal segment of the pedicel of cirrus VI.

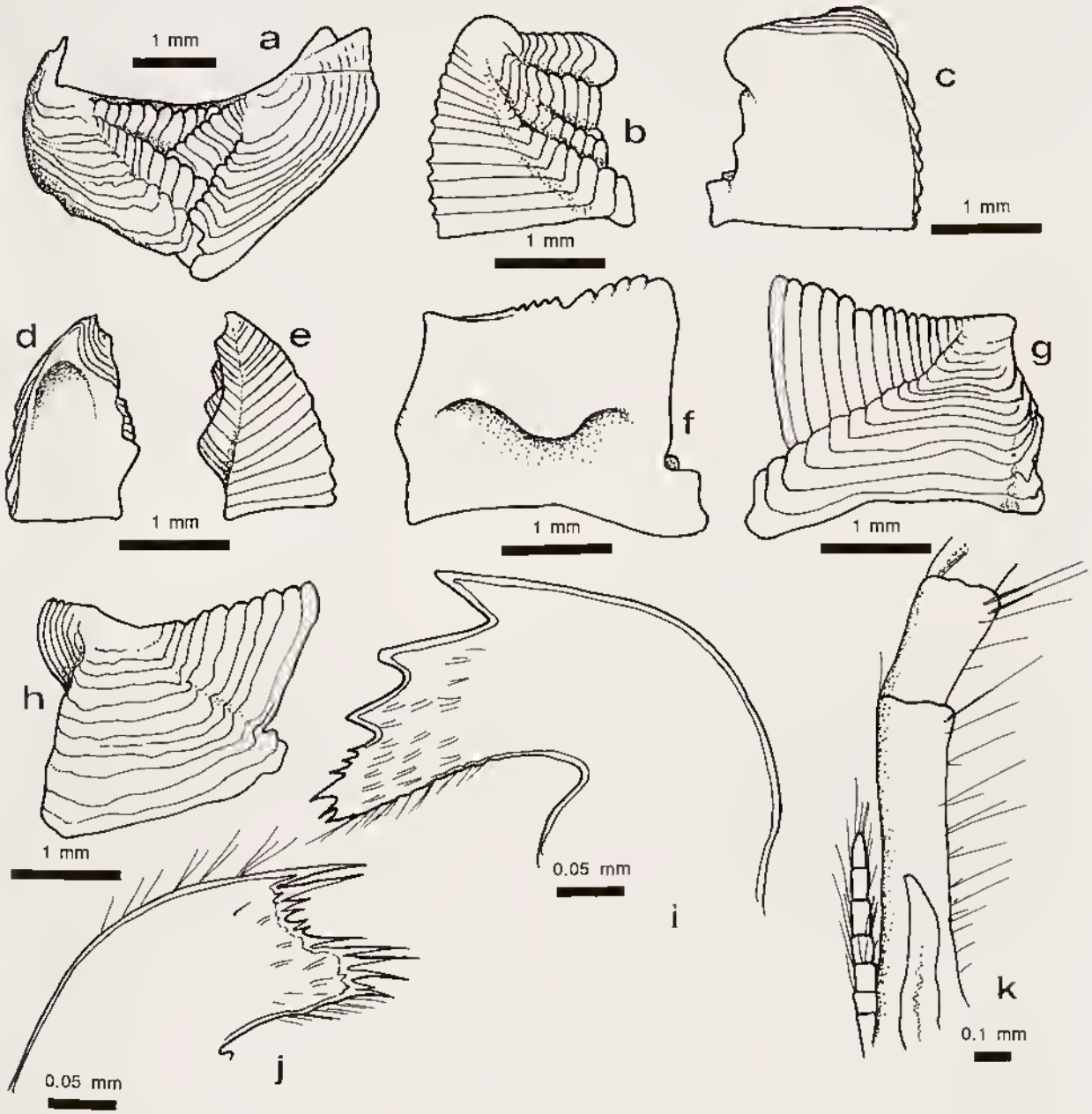

FIG. 10. — *Metaverruca norfolkensis* sp. nov. : **a**, holotype, rostrum and carina, MNHN-Ci 2301; **b**, movable tergum (exterior); **c**, movable tergum (interior); **d**, movable scutum (interior); **e**, movable scutum (exterior); **f**, fixed scutum showing myophore (interior); **g**, fixed scutum (exterior); **h**, fixed tergum (exterior); **i**, mandible; **j**, first maxilla; **k**, basal portion of sixth cirrus, with penis and caudal appendage attached. All material from MNHN-Ci 2301, BIOCAL, stn CP 29.

Source MNHN, Paris

DESCRIPTION. — Medium sized *Metaverruca* with shell white, low conic, sides steep; operculum sub-parallel to base, orifice D-shaped; exterior generally smooth, with relatively closely spaced concentric growth lines; rostrum and carina articulating with up to three ribs; basis membranous.

Fixed scutum quadrangular, with a well formed myophore for adductor muscle attachment; basal margin of shell thickened and inflected on larger specimens; fixed tergum a little narrower than the fixed scutum.

Movable tergum quadrangular, with a well defined apico-basal rib, and three secondary ribs, interlocking with the movable scutum; articular margin moderately concave; movable scutum triangular, with three ribs interlocking with the tergum and a further adjacent curved, apico-basal rib terminating at the rostro-carinal suture; occludent portion lacking ribbing; internally with a moderately strong depression for adductor muscle attachment; both opercular plates together form an almost straight rostro-carinal hinge.

Mandible tridentate, lower angle pectinate; first maxilla with two large upper spines, notch with four small spines, lower angle hirsute, with four large spines.

Cirri possess the following number of segments (r-c being the rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
4.1	12,9	7,8	11,13	20,21	23,24	24,27	7
5.0	13,11	9,11	14,15	20,22	22,24	22,25	9

The caudal appendages are very short and thin, with length a little less than that of the basal segment of the pedicel of cirrus VI; penis thin, short, length a little less than the caudal appendages.

DISCUSSION. — *Metaverruca norfolkensis* is very close to *M. recta*, differing essentially in the number of ribs present on the opercular plates. It may be distinguished from *M. defayeae* by the mandible, shorter caudal appendages, more widely spaced growth ridges, a broader scutum and a more quadrangular tergum.

ETYMOLOGY. — Geographic : Norfolk Ridge, southwest Pacific Ocean.

DISTRIBUTION. — New Caledonia, 255-1100 metres.

Metaverruca pacifica sp. nov.

Fig. 11 a-g, 16 c-d

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn CP 198, 18°49.40'S, 163°18.80'E, 585 m, 20.09.1985 : 12 specimens, on bivalves.

Loyalty Islands. MUSORSTOM 6 : stn CP 438, 20°23.00'S, 166°20.10'E, 780 m, 18.02.1989 : 1 specimen, on pumice. — Stn CP 466, 21°05.25'S, 167°32.20'E, 540 m, 21.02.1989 : 3 specimens, on gastropod and *Coronula*. — Stn CP 467, 21°05.13'S, 167°32.11'E, 575 m, 21.02.1989 : 1 specimen, on *Coronula*. — Stn DW 483, 21°19.80'S, 167°47.80'E, 600 m, 23.02.1989 : 1 specimen, on brachiopod.

Chesterfield Islands. MUSORSTOM 5 : stn DW 341, 19°45.90'S, 158°43.37'E, 620-630 m, 16.10.1986 : 2 specimens, on echinoderm. — Stn DW 342, 19°43.50'S, 158°47.72'E, 660 m, 16.10.1986 : 4 specimens, on bivalve. — Stn CP 363, 19°47.90'S, 158°44.30'E, 685-700 m, 19.10.1986 : 125+ specimens, on shell detritus incl. *Nautilus*. — Stn CP 364, 19°45.30'S, 158°46.50'E, 675 m, 19.10.1986 : 29 specimens, on spatangoids and annelid tubes. — Stn CC 365, 19°42.82'S, 158°48.00'E, 710 m, 19.10.1986 : 50+ specimens, on *Nautilus*, etc. — Stn CC 367, 19°36.80'S, 158°53.20'E, 855-830 m, 19.10.1986 : 35 specimens (MNHN-Ci 2330), on pebbles.

CORAIL 2 : stn CP 17, 20°48.14'S, 160°57.14'E, 500 m, 21.07.1988 : 1 specimen.

TYPES. — *Holotype* : MNHN-Ci 2303, rostro-carinal diameter : 6.5 mm, height : 3.9 mm, (from MUSORSTOM 5, Stn CP 363).

Paratypes : MNHN-Ci 2304, (from CORAIL 2, Stn CP 17), MNHN-Ci 2305, (from MUSORSTOM 4, Stn CP 198), MNHN-Ci 2306-2309, (from MUSORSTOM 5, Stn CP 363); UNITEC Cat. Nos. CAX 103-105, (from MUSORSTOM 5, Stn CP 363); USNM, (from MUSORSTOM 5, Stn CP 363).

DIAGNOSIS. — *Metaverruca* with movable tergum and scutum having four articular ribs; exterior generally smooth with widely spaced growth lines; caudal appendages more than twice the length of the basal segment of the pedicel of cirrus VI.

Source : MNHN, Paris

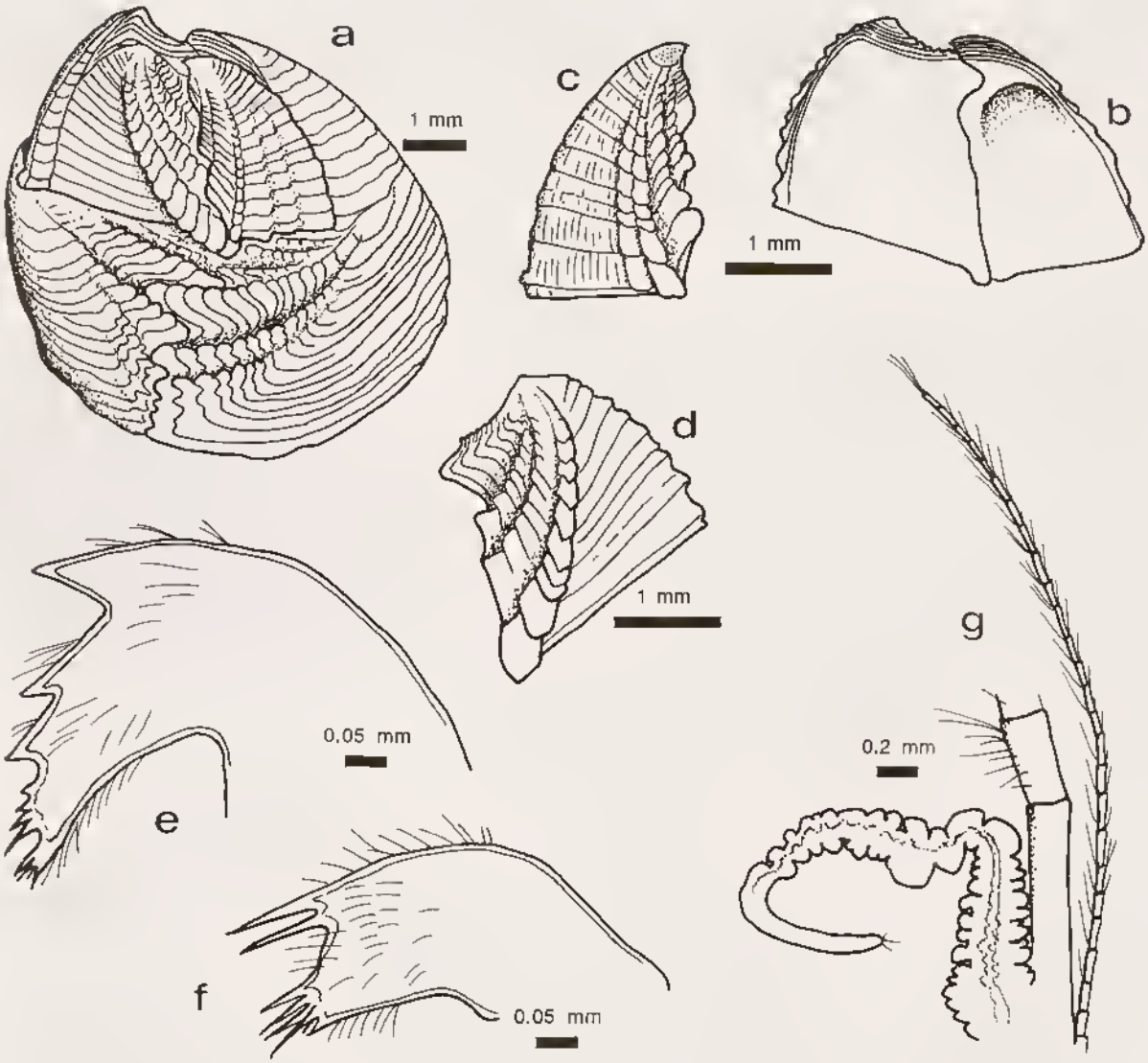

FIG. 11. — *Metaverruca pacifica* sp. nov. : **a**, holotype, complete shell (dorsal view), MNHN-Ci 2303; **b**, articulated movable scutum and tergum (interior); **c**, movable scutum (exterior); **d**, movable tergum (exterior); **e**, mandible; **f**, first maxilla; **g**, basal portion of sixth cirrus, with penis and caudal appendage attached. Material : a, g, from MUSORSTOM 5, stn CP 363; b-d, from CORAIL 2, stn CP 17; e-f, from MUSORSTOM 4, stn CP 198.

DESCRIPTION. — Medium sized *Metaverruca* with shell white, low conic, sides steep; operculum sub-parallel to base, D-shaped; exterior generally smooth, with well spaced concentric growth lines; rostrum and carina articulating with up to five ribs. Rostrum with a distinctly ribbed zone arcing toward the base of the movable scutum. In large specimens, this zone can have up to four separate ribs, and can therefore be relatively diagnostic for the species; basis membranous.

Fixed scutum with a well formed myophore for adductor muscle attachment; basal margin of shell thickened and inflected on larger specimens; fixed tergum a little over half the width of fixed scutum, on larger specimens basal margin thickened and inflected.

Movable tergum quadrangular, with three large and one or more narrow articular ridges, movable scutum triangular, with corresponding ridges externally and a moderate pit for adductor muscle attachment internally; both plates together form a straight rostro-carinal hinge.

Mandible tridentate, lower angle pectinate and divided into two portions; first maxilla with two prominent upper spines, a notch without spines and with four spines on a hirsute lower angle; penis moderately short,

Source MNHN, Paris

approximately two and a half times the length of the basal segment of the pedicel of cirrus VI. Cirrus I with anterior ramus particularly hirsute. Cirri possessed the following number of segments (r-c being the rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
5.7	8,10	9,13	14,15	+	+	+	21+
6.9	11,15	12,16	20,22	24,29	32,36	39,41	24
7.1	11,14	11,16	21,22	22,24	25,28	24,28	26
7.5	11,15	13,19	22,23	26,29	30,34	31,32	24

+ incomplete ramis

Of the specimens examined, the length of the caudal appendages was consistently more than twice that of the basal segment of the pedicel of cirrus VI.

DISCUSSION. — *M. pacifica* is characterised by the presence of four prominent articular ribs on the opercular plates, and the long caudal appendages; all except small specimens have a rostrum with a distinct ribbed zone arcing back to the base of the movable scutum, clearly differentiating this species from *M. recta*, *M. norfolkensis* and *M. defayeae*. On rare occasions, excessive development of this zone behind the apex of the rostrum may cause the rostrum to move slightly in from the plate margin, showing similarity to *Rostratoverruca*. It is important to note that of the more than 100 specimens studied only one possessed an apex clearly removed from the margin, and this only by a small distance; further, the fixed scutum on this species has a myophore.

ETYMOLOGY. — Geographic : Pacific Ocean.

DISTRIBUTION. — New Caledonia, 500-830 metres.

Metaverruca plicata sp. nov.

Fig. 12 a-i

MATERIAL EXAMINED. — **Loyalty Islands**. MUSORSTOM 6 : stn DW 405, 20°29.75'S, 166°41.00'E, 520 m, 14.02.1989 : 1 specimen. — Stn DW 468, 21°05.86'S, 167°32.98'E, 600 m, 21.02.1989 : 1 specimen.

TYPES. — *Holotype* : MNHN-Ci 2310, rostro-carinal diameter : 8.9 mm, height : 3.6 mm, (from MUSORSTOM 6, Stn DW 405).

Paratype : MNHN-Ci 2311, (from MUSORSTOM 6, Stn DW 468).

DIAGNOSIS. — A medium to large *Metaverruca* with strong external ribbing; movable tergum and scutum having three articular ribs; movable scutum moderately narrow; caudal appendages long, about two and a half times the length of the basal segment of the pedicel of cirrus VI.

DESCRIPTION. — Medium to large sized *Metaverruca* with shell white, low conic, sides steep; operculum sub-parallel to base, orifice D-shaped; exterior characterised by strong, sharp vertical ribbing, with relatively closely spaced concentric growth lines, secondary ribs develop in the interstices of the primary ribs as the shell diameter increases, thus maintaining regularity of spacing; rostrum and carina articulating with up to six ribs; basis membranous.

Fixed scutum quadrangular, with a well formed myophore for adductor muscle attachment, articulating with the fixed tergum with one rib and with rostrum with four ribs; basal margin of shell thickened and inflected on larger specimens; fixed tergum of similar width to the fixed scutum, articulating with the carina with four ribs.

Movable tergum quadrangular, with a well defined apico-basal rib, and two secondary ribs, interlocking with the movable scutum; movable scutum triangular, relatively narrow, with two ribs interlocking with the tergum and a further adjacent curved, apico-basal rib terminating at the rostro-carinal suture; occludent portion with fine longitudinal striae crossing growth lines; internally with a moderately weak depression for adductor muscle attachment; both opercular plates together form an almost straight rostro-carinal hinge.

Source : MNHN, Paris

Mandible tridentate, lower angle pectinate, divided into two parts; first maxilla with a prominent upper spine and three smaller adjacent spines, lower angle with four long and three shorter spines.

The holotype cirri possess the following number of segments (r-c being the rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
4.1	12,16	10,13	15,17	23,25	28,32	31,31	27

The caudal appendages are rather long, almost 3 times that of the basal segment of the pedicel of cirrus VI; penis vestigial.

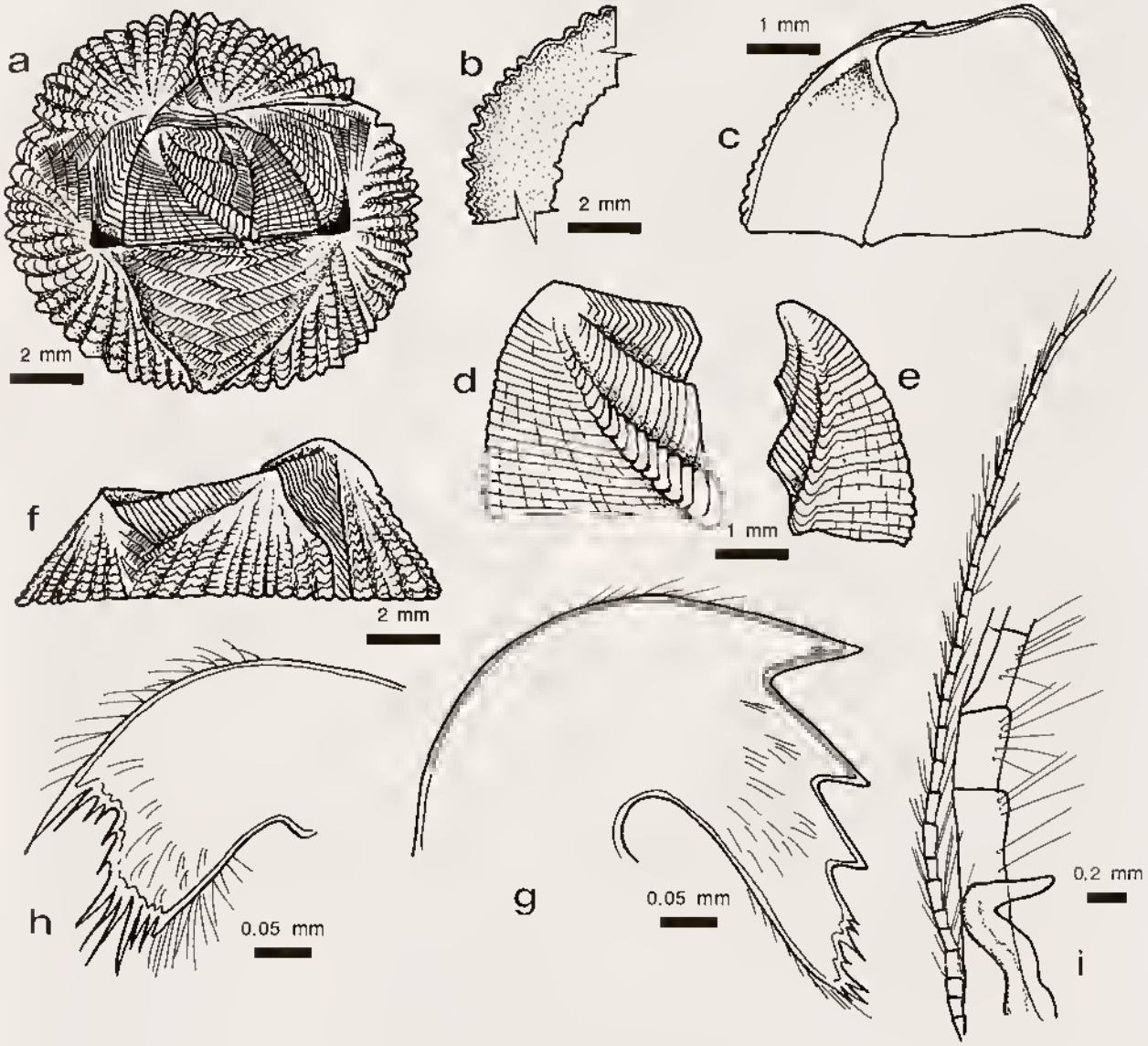

FIG. 12. — *Metaverruca plicata* sp. nov. : **a**, holotype, complete shell (dorsal view), MNHN-Ci 2310; **b**, holotype, portion of base (ventral view); **c**, articulated movable scutum and tergum (interior); **d**, movable tergum (exterior); **e**, movable scutum (exterior); **f**, holotype, complete shell (fixed tergal-fixed scutal view); **g**, mandible; **h**, first maxilla; **i**, basal portion of sixth cirrus, with penis and caudal appendage attached. All material from MUSORSTOM 6, stn DW 405.

DISCUSSION. — *M. plicata* is very distinct species, showing greatest similarity to *Metaverruca corrugata* (Broch, 1932), from which it differs in having significantly longer caudal appendages, a narrower movable scutum,

Source : MNHN, Paris

a greater number of articulating ribs on the wall plates and a lower shell profile. Like most *Metaverruca*, the rami of cirrus I possess more segments than those of cirrus II.

ETYMOLOGY. — Morphologic : in allusion to strong external ribbing, *plicatus* = ribbed or folded (Latin).

DISTRIBUTION. — Loyalty Islands, 520-600 metres.

Metaverruca recta (Aurivillius, 1898)

Fig. 13 a-f

Verruca recta Aurivillius, 1898 : 195.
Verruca sculpta Aurivillius, 1898 : 197.
Verruca linearis Gruvel, 1900 : 243; 1902 : 107, pl. 5 figs 11, 12 .
Verruca magna Gruvel, 1901 : 261; 1092 : 109, pl. 5 figs 1, 2 .
Verruca halotheca Pilsbry, 1907 : 188, pl. 12 figs 9, 10.
Verruca capsula Hock, 1913 : 130, pl. 12 figs 1-3, pl. 13 figs 1-4.
Verruca coraliophila Pilsbry, 1916 : 21, pl. 1 figs 1-5.
Verruca cookei - ROSELL, 1989 : 299, pl. 11 figs r,s,u,v; 1991 : 33. Non Pilsbry, 1927.

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn DW 8, 20°34.35'S, 166°53.90'E, 435 m, 12.08.1985 : 1 specimen, on pebble. — Stn CP 23, 22°46'S, 166°20'E, 2040 m, 28.08.1985 : 27 specimens (MNHN-Ci 2312), on pebbles and bivalve. — Stn CP 26, 20°40'S, 166°27'E, 1618-1740 m, 28.08.1985 : 2 specimens (MNHN-Ci 2313). — Stn CP 27, 22°06'S, 166°27'E, 1850-1900 m, 28.08.1985 : 20 specimens, on pebbles. — Stn CP 29, 23°08'S, 166°40'E, 1100 m, 29.08.1985 : 6 specimens, on pumice. — Stn CP 30, 23°09'S, 166°41'E, 1140 m, 29.08.1985 : 6 specimens, on pumice. — Stn CP 52, 23°06'S, 167'47'E, 540-600 m, 31.08.1985 : 1 specimen, on coral. — Stn CP 57, 23°44'S, 166°58'E, 1490-1620 m, 01.09.1985 : 17 specimens, on pumice. — Stn CP 62, 24°19'S, 167'49'E, 1395-1410 m, 02.09.1985 : 1 specimen, on pumice. — Stn CP 72, 22°10'S, 167°33'E, 2100-2110 m, 04.09.1985 : 3 specimens, on bivalve and pumice. — Stn DW 81, 24°29.31'S, 166°46.56'E, 430-470 m, 31.08.1985 : 1 specimen.

CHALCAL 2 : stn DW 72, 24°54.50'S, 168°22.30'E, 527 m, 29.10.1986 : 1 specimen, on bivalve.

BIOGEOCAL : stn CP 272, 21°00'S, 166°57'E, 1615-1710 m, 20.04.1987 : 1 specimen.

SMIB 5 : stn DW 86, 22°19.80'S, 168°42.80'E, 320 m, 11.09.1989 : 1 specimen, on coral.

SMIB 8 : stn DW 146, 24°55.20'S, 168°21.70'E, 514-522 m, 27.01.1993 : 1 specimen, on sponge.

Chesterfield Islands. MUSORSTOM 5 : stn DW 299, 22°47.70'S, 159°23.70'E, 360-390 m, 11.10.1986 : 4 specimens, on *Stenohelia*. — Stn CP 323, 21°18.52'S, 157°57.62'E, 970 m, 14.10.1986 : 4 specimens, on pumice. — Stn CP 324, 21°15.01'S, 157°51.33'E, 970 m, 14.10.1986 : 2 specimens, on pumice. — Stn DW 335, 20°03.24'S, 158°45.35'E, 315 m, 15.10.1986 : 4 specimens, on coral. — Stn DC 345, 19°39.70'S, 158°32.40'E, 305-310 m, 16.10.1986 : 1 specimen, on pebble.

Loyalty Islands. MUSORSTOM 6 : stn DW 413, 20°40.10'S, 167°03.50'E, 463 m, 15.02.1989 : 6 specimens, on spatangoids. — Stn DW 417, 20°41.80'S, 167°03.65'E, 283 m, 16.02.1989 : 11 specimens, on brachiopods. — Stn DW 439, 20°46.40'S, 167°17.40'E, 288 m, 19.02.1989 : 1 specimen. — Stn DW 452, 21°00.30'S, 167°25.50'E, 300 m, 20.02.1989 : 6 specimens, on pebbles. — Stn DW 456, 21°00.71'S, 167°26.35'E, 240 m, 20.02.1989 : 8 specimens, on spatangoids. — Stn DW 457, 21°00.42'S, 167°28.71'E, 353 m, 20.02.1989 : 1 specimen, on pebble. — Stn DW 472, 21°08.60'S, 167°54.70'E, 300 m, 22.02.1989 : 1 specimen. — Stn DW 480, 21°08.50'S, 167°55.98'E, 380 m, 22.02.1989 : 1 specimen, on pebble. — Stn CP 481, 21°21.85'S, 167°50.30'E, 300 m, 23.02.1989 : 1 specimen. — Stn DW 482, 21°21.50'S, 167°46.80'E, 375 m, 23.02.1989 : 2 specimens, on coral.

Wallis and Futuna Islands. MUSORSTOM 7 : stn DW 502, 14°19.8'S, 178°06.5'W, 516-535 m, 11.05.1992 : 4 specimens, on pebbles. — Stn DW 511, 14°14.0'S, 178°11.5'W, 400-450 m, 12.05.1992 : 6 specimens, on pebbles. — Stn CP 531, 12°31.6'S, 176°39.3'W, 580-600 m, 16.05.1992 : 1 specimen, on pebble. — Stn DW 537, 12°30.0'S, 176°41.0'W, 325-400 m, 16.05.1992 : 1 specimen, on pebble. — Stn DW 540, 12°26.7'S, 177°28.4'W, 600 m, 17.05.1992 : 2 specimens, on pebbles. — Stn DW 541, 12°26.7'S, 177°28.0'W, 500-505 m, 17.05.1992 : 1 specimen, on pebble. — Stn CP 550, 12°14.8'S, 177°28.0'W, 800-810 m, 18.05.1992 : 1 specimen, on gorgonian. — Stn CP 551, 12°15.3'S, 177°28.1'W, 791-795 m, 18.05.1992 : 59 specimens, on shell fragments. — Stn CP 552, 12°15.7'S, 177°27.8'W, 786-800 m, 18.05.1992 : 2 specimens, on shell fragments. — Stn DW 555, 11°47.5'S, 178°19.2'W, 540-542 m, 19.05.1992 : 1 specimen, on shell. — Stn DW 557, 11°48.1'S, 178°18.2'W, 600-608 m, 19.05.1992 : 2 specimens (MNHN-Ci 2314), on pebbles. — Stn DW 558, 11°49.9'S, 178°18.9'W, 635 m, 19.05.1992 : 1 specimen, on pebble. — Stn DW 560, 11°47.0'S, 178°20.0'W, 697-702 m, 19.05.1992 : 3 specimens, on pebbles. — Stn CP 562, 11°48.1'S, 178°22.1'W, 775-777 m, 19.05.1992 : 53 specimens, on echinoderms and shell. — Stn CP 564, 11°46.1'S, 178°27.4'W, 1015-1020 m, 20.05.1992 : 15 specimens, on pebbles. — Stn CP 565, 11°47.4'S, 178°25.3'W, 900 m,

Source : MNHN, Paris

20.05.1992 : 7 specimens, on shells. — Stn DW 586, 13°10.7'S, 176°13.1'W, 510-600 m, 22.05.1992 : 1 specimen, on coral. — Stn DW 597, 12°31.4'S, 174°18.6'W, 469-475 m, 24.05.1992 : 1 specimen, on coral. — Stn DW 598, 12°30.5'S, 174°18.6'W, 702-708 m, 24.05.1992 : 2 specimens, on pebbles. — Stn DW 618, 14°21.7'S, 178°00.5'W, 420-435 m, 27.05.1992 : 1 specimen, on spatangoid. — Stn CP 623, 12°34.2'S, 178°15.1'W, 1280-1300 m, 28.05.1992 : 1 specimen, on scalpellid. — Stn DW 636, 13°39.4'S, 179°55.5'E, 650-700 m, 30.05.1992 : 1 specimen, on coral.

Philippines. MUSORSTOM 3 : stn CP 106, 13°47.00'S, 120°30.30'E, 668 m, 02.06.1985 : 3 specimens, on bivalve.

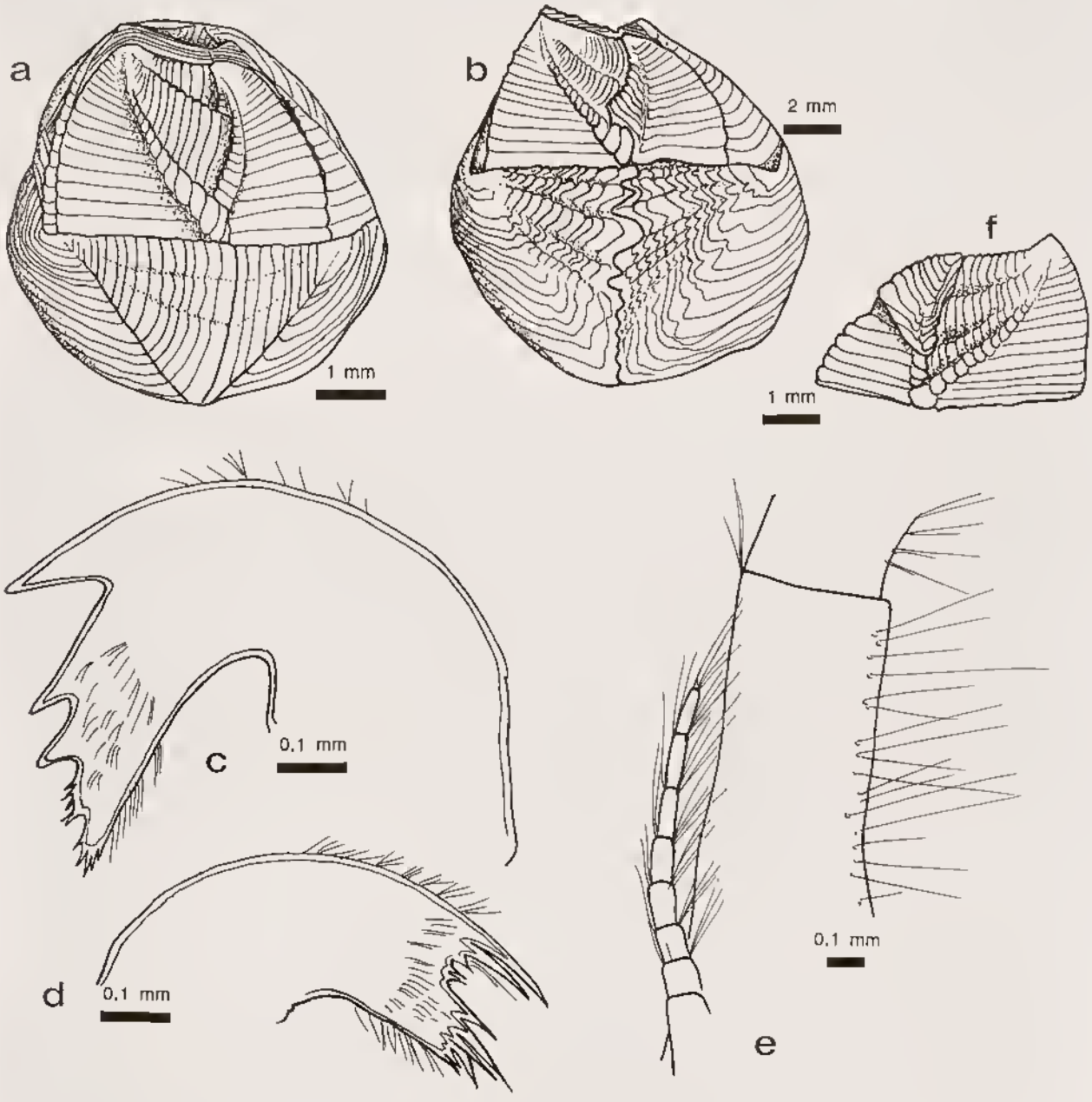

FIG. 13. — *Metaverruca recta* (Aurivillius, 1898) : **a**, complete shell (dorsal view), MNHN-Ci 2312; **b**, complete shell, larger specimen, showing development of interlocking ribs between rostrum and carina (dorsal view), MNHN-Ci 2313; **c**, mandible; **d**, first maxilla; **e**, basal portion of sixth cirrus, with caudal appendage attached; **f**, articulated movable scutum and tergum, showing repair to damaged scutum and resultant development of what appears to be a fourth rib on the tergum (exterior), MNHN-Ci 2314. Material : a, c-e from BIOCAL, stn CP 23; b from BIOCAL, stn CP 26; f from MUSORSTOM 7, stn DW 557.

Source : MNHN, Paris

DIAGNOSIS. — *Metaverruca* with movable tergum and scutum having three articular ribs; exterior generally smooth with widely spaced growth lines; caudal appendages short.

DESCRIPTION. — A large verrucid, shell white, low conic, sides steep; operculum sub-parallel to base, D-shaped; exterior generally smooth, with fine, well spaced concentric growth lines; rostrum and carina articulating with up to seven ribs.

Fixed scutum quadrangular, with a well formed myophore for adductor muscle attachment; basal margin of shell thickened and inflected on larger specimens; fixed tergum with umbo extending fractionally beyond that of movable tergum.

Movable tergum quadrangular, of low relief, with two prominent and one narrow articular ribs; movable scutum triangular of low relief, with an even narrower third rib, internally opercular plates are of low relief, plates together form a straight rostro-carinal hinge.

Mandible tridentate, lower angle pectinate, divided into two parts, first maxilla with one prominent and two larger spines above the notch and four on the lower angle; penis short, a little less than the length of the caudal appendages. Cirri possessed the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	It	IIt	IV	V	VI	c.a.
5.2	11,10	7,14	22,23	22,27	31,31	31,32	8
14.9	11,12	9,21	32,34	36,40	43,41	40,43	8

Of the specimens examined, the length of the caudal appendages was consistently a little less than that of the basal segment of the pedicel of cirrus VI.

DISCUSSION. — Numerous workers have recognised the need to synonomise a number of *Metaverruca* species; GRUVEL (1920), NILSSON-CANTELL (1929), BUCKERIDGE (1983), with SOUTHWARD and SOUTHWARD (1958), noting that *recta* has priority.

M. recta is one of the largest verrucids, with specimens over 14.5 mm rostro-carinal diameter being measured from this collection (BIOCAL, Stn CP 27). The three articular ribs between movable scutum and tergum, the generally inornate exterior, the fixed scutum myophore, and the short caudal appendages distinguish this form from all other verrucid species. (Even specimens of less than 2.0 mm rostro-carinal diameter possessed the three articular ribs on the movable opercular plates).

The three articular ribs on the opercular plates is an important characteristic for recognising this species; one specimen from MUSORSTOM 7, Stn DW 557, however, possessed four ribs, and in this instance appeared very similar to *M. defayeae*, a closer examination showed that the extra rib was a result of damage (mechanical?), with the movable scutum being broken (fig. 13f). The animal was able to repair the damage, but in the process developed the further rib.

DISTRIBUTION. — Cosmopolitan, 160-2110 metres. Miocene (New Zealand, BUCKERIDGE, 1983).

Genus *ROSTRATOVERRUCA* Broch, 1922

Verruca "Sectio *Rostrato-verruca*" Broch, 1922 : 298.
Verruca (Rostratoverruca) - FOSTER, 1978 : 68.
Rostratoverruca - ZEVINA, 1978 : 1813.

DIAGNOSIS. — Verrucids with apex of rostrum removed from margin; fixed scutum without myophore; operculum sub-parallel to base.

TYPE. — *Verruca nexa* Darwin, 1854 : 522. West Indies, 60 metres.

SPECIES. — With the placement of *Verruca dens* within *Brochiverruca*, the following 8 species are now attributed to this genus : *Rostratoverruca conchula* (Hoek, 1913), Timor; *Rostratoverruca intexta* (Pilsbry, 1912),

Source : MNHN, Paris

Indian Ocean - Western Pacific; *Rostratoverruca koehleri* (Gruvel, 1907), Bay of Bengal; *Rostratoverruca kruegeri* (Broch, 1922), Western Pacific; *Rostratoverruca murrayi* (Stubbings, 1936), Zanzibar; *Rostratoverruca nexa* (Darwin, 1854), West Indies; *Rostratoverruca sewelli* (Stubbings,1936), Zanzibar; *Rostratoverruca malevichi* Zevina, 1988, South Pacific.

DISCUSSION. — As many of the specimens studied in this collection were attached to cidaroid spines, the angle between operculum and base is often difficult to ascertain. The most important criterion for recognising this genus being the displaced rostral apex.

STRATIGRAPHIC RANGE. — Recent.

DISTRIBUTION. — West Indies and Indo-West Pacific, 60-3250 metres.

Rostratoverruca intexta (Pilsbry, 1912)

Fig. 14 a-f

Verruca intexta Pilsbry, 1912 : 292; 1916 : 47. — NILSSON-CANTELL, 1927 : 774; 1929 : 468, fig. 3. — STUBBINGS, 1940 : 389.
Verruca conchula Hoek, 1913 : 146, figs 14-15.
Verruca (Rostratoverruca) intexta · ROSELL, 1989 : 26, pl. 7 f-g; 1991 : 33.

MATERIAL EXAMINED. — **Indonesia**. KARUBAR : stn CP 9, 05°23'S, 132°29'E, 361-389 m, 23.10.1991 : 25 specimens, (MNHN-Ci 2318-2319), on glass sponge. — Stn CC 10, 05°21'S, 132°29'E, 329-389 m, 23.10.1991 : 4 specimens, on flat surface. — Stn CP 12, 05°25'S, 132°37'E, 412-434 m, 23.10.1991 : 10 specimens, on glass sponge. — Stn CP 35, 06°07'S, 132°44'E, 390-502 m, 27.10.1991 : 2 specimens, on glass sponge. — Stn CC 40, 07°46'S, 132°31'E, 442-468 m, 28.10.1991 : 4 specimens, on glass sponge. — Stn CC 56, 08°16'S, 131°59'E, 552-549 m, 31.10.1991 : 2 specimens, on glass sponge. — Stn CP 59, 08°20'S, 132°11'E, 405-399 m, 31.10.1991 : 1 specimen. — Stn CP 69, 08°42'S, 131°53'E, 356-367 m, 2.11.1991 : 7 specimens, on coral, *Chirona*, *Scalpellum*. — Stn CP 71, 08°38'S, 131°44'E, 477-480 m, 2.11.1991 : 1 specimen. — Stn CP 86, 09°25'S, 131°13'E, 226-222 m, 4.11.1991 : 3 specimens, on gastropod.

Philippines. MUSORSTOM 3 : stn CP 106, 13°47.0'S, 120°30.3'E, 640-668 m, 2.06.1985 : 1 specimen.

New Caledonia. BIOCAL : stn CP 67, 24°55'S, 168°22'E, 500-510 m, 3.09.1985 : 1 specimen, on coral.
CHALCAL 2 : stn DW 74, 20°04.36'S, 168°38.38'E, 650 m, 3.09.1985 : 1 specimen, on hydrozoan.

Loyalty Islands. MUSORSTOM 6 : stn DW 449, 20°54.40'S, 167°17.75'E, 300 m, 20.02.1985 : 3 specimens, on gorgonian.

DIAGNOSIS. — *Rostratoverruca* with prominent, rounded ribbing; rostrum patelliform, with apex removed some considerable distance from the scutal border; movable tergum and scutum each with three articular ribs; operculum sub-parallel to base.

DESCRIPTION. — Shell cream-white, walls with prominent, rounded ribbing; rostrum patelliform, with apex central in large specimens, apex distinctly beaked; carina with an elongated, straight, "prow-like" upper rib articulating with the rostrum, apex produced, to extend well out beyond the basi-tergal angle of the tergum; base membranous.

Fixed scutum broader than fixed tergum, articulating with up to three ribs in larger specimens; both plates with incurved beaks, and with apices extending beyond those of the movable plates.

Movable scutum only a little narrower than the movable tergum, triangular, with three curved, diagonal ribs on the tergal side, the upper two secondary ribs interlocking with the tergum, the primary (apico-basal) rib interlocking with both tergum and rostrum at the basi-tergal angle; three further ribs occur on the occludent portion, interlocking basally with the rostrum; apex beaked; interior with a rounded moderately well developed adductor muscle depression.

Movable tergum quadrilateral, apex incurved towards scutum, primary apico-basal rib curved, interlocking at the basi-scutal angle; two secondary ribs articulate with the movable scutum.

Source : MNHN, Paris

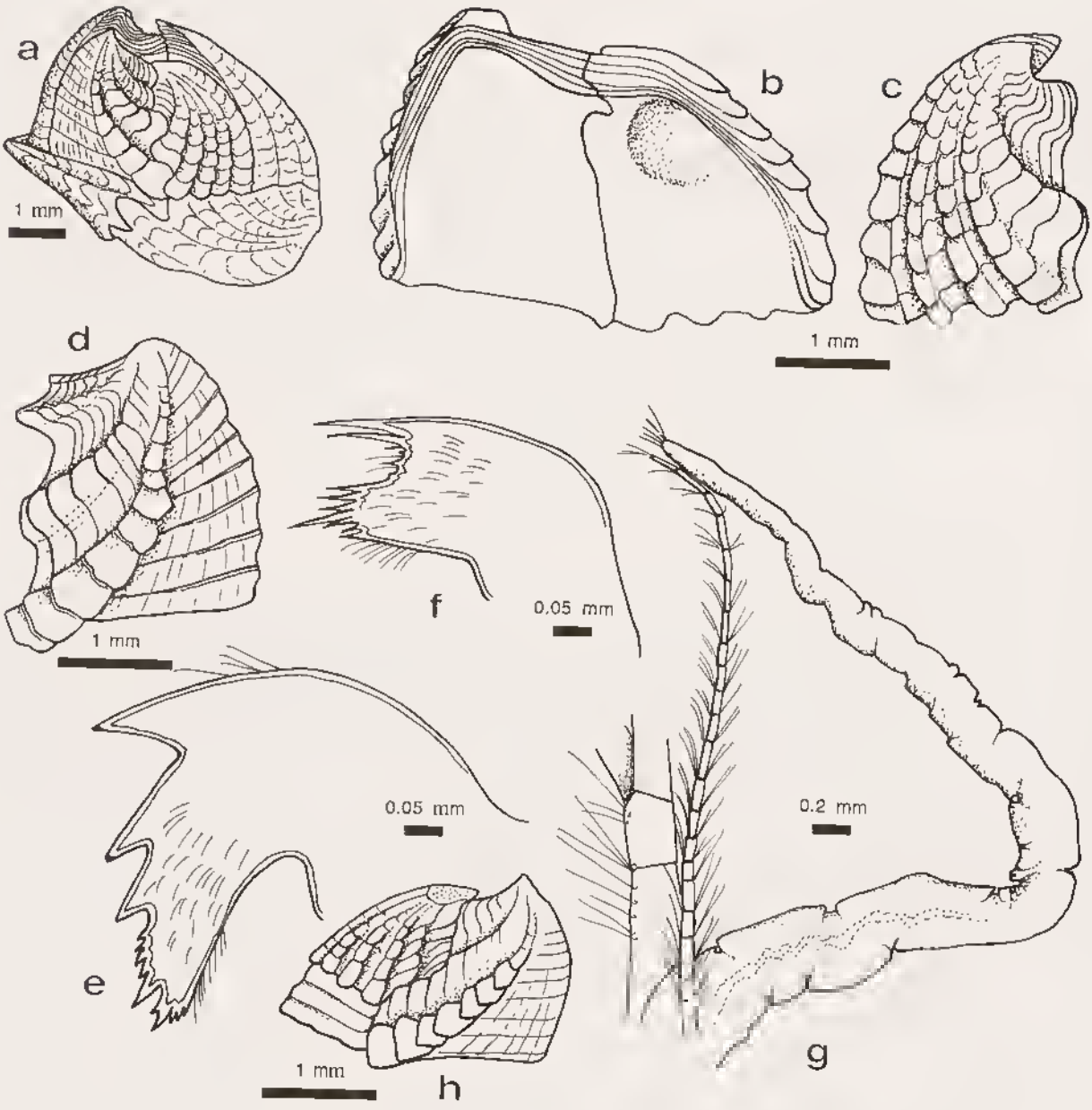

FIG. 14. — *Rostratoverruca intexta* (Pilsbry, 1912) : **a**, complete shell (dorsal view), MNHN-Ci 2318; **b**, articulated movable scutum and tergum (interior); **c**, movable scutum (exterior); **d**, movable tergum (exterior); **e**, mandible; **f**, first maxilla; **g**, basal portion of sixth cirrus, with penis and caudal appendage attached; **h**, articulated movable scutum and tergum, showing repair to damaged scutum and resultant development of a non-ribbed portion (exterior), MNHN-Ci 2319. All material from KARUBAR, stn CP 9.

Mandible tridentate, lower angle pectinate, divided into two parts; first maxilla with two prominent upper spines, notch hirsute, lower angle hirsute, with six or more spines.

Cirrus I and cirrus II subequal; caudal appendages longer than the pedicel of cirrus VI; penis very long, proboscifform, slightly longer than caudal appendages. Cirri possessed the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
5.4	9,13	9,14	18,19	21,22	23,25	23,26	20

Source : MNHN, Paris

DISCUSSION.— This species is distinguished from *Rostratoverruca nexa* by the patelliform rostrum, the strong ribbing, the number of ribs on the movable tergum and scutum, and the prominent prow-like upper rib on the carina. It is similar to *Rostratoverruca kruegeri* (Broch, 1922) but possesses a much broader movable tergum and scutum than that species, and unlike *R. kruegeri*, has no strong ribbing on the occludent side of the apico-basal rib of the tergum.

The large amount of material available for observation provided an opportunity to gain an appreciation of morphological variation. One specimen in particular (fig. 14h), appears to demonstrate the effect of pathogenesis on both the movable scutum and rostrum, with characteristically strong ribbing present in early growth, but abruptly absent subsequently.

DISTRIBUTION. — Indo-Pacific, 194-1002 metres.

Rostratoverruca kruegeri (Broch, 1922)

Fig. 15 a-f

Verruca Krügeri Broch, 1922 : 295, figs 43-44.
Verruca (Rostratoverruca) krügeri - BROCH, 1932 : 46.

MATERIAL EXAMINED.— **Indonesia**. KARUBAR : stn CP 46, 08°01'S, 132°51'E, 271-273 m, 29.10.1991 : 28 specimens (MNHN-Ci 2320), on cidaroid spines. — Stn CP 85, 09°22'S, 131°14'E, 245-240 m, 4.11.1991 : 85 specimens, on cidaroid spines.
Philippines. MUSORSTOM 3 : stn CP 139, 11°52.9'S, 120°14.7'E, 240-267 m, 6.06.1985 : 200+ specimens, on cidaroid spines.

DIAGNOSIS. — *Rostratoverruca* with prominent, rounded ribbing on rostrum and carina; rostrum patelliform, with apex removed some considerable distance from the scutal border; fixed scutum and tergum with weak longitudinal ribbing; movable tergum and scutum each with four articular ribs.

DESCRIPTION. — Shell white, rostrum and carina with prominent, rounded ribbing; rostrum patelliform, with apex central in large specimens, apex slightly incurved; carina with a moderately elongated, "prow-like" upper rib articulating with the rostrum, but with superior margin ridged, due to fine secondary ribbing; apex produced, to extend out beyond the basi-tergal angle of the tergum; carina and rostrum generally interlocking with three ribs; base membranous.

Fixed scutum broader than fixed tergum, articulating with up to three ribs in larger specimens; longitudinal ribbing weak, especially on smaller specimens; both plates with apices slightly incurved, that of fixed tergum extending beyond that of the movable tergum.

Movable scutum only a little narrower than the movable tergum, triangular, with four curved, diagonal ribs on the tergal side, the upper three secondary ribs interlocking with the tergum, the primary (apico-basal) rib interlocking with both tergum and rostrum at the basi-tergal angle; three further ribs occur on the occludent portion, interlocking basally with the rostrum; apex incurved; interior with a rounded, moderately well developed adductor muscle depression.

Movable tergum quadrilateral, apex incurved towards scutum, primary apico-basal rib curved, interlocking at the basi-scutal angle; three secondary ribs articulate with the movable scutum; scutal margin with sulcus immediately below upper rib; three further ribs occur on the occludent portion, interlocking with the tergum.

Mandible tridentate, lower angle pectinate; first maxilla with prominent upper spine, notch poorly differentiated, with three small spines, lower angle hirsute, with four spines.

Cirrus I and cirrus II subequal; caudal appendages about half the length of cirrus VI; penis very long, probosciform, slightly longer than cirrus VI. Cirri possessed the following number of segments (r-c being rostro-carinal diameter) :

r-c (mm)	I	II	III	IV	V	VI	c.a.
5.6	8,13	9,13	14,16	19,21	19,23	20,24	19

Source : MNHN, Paris

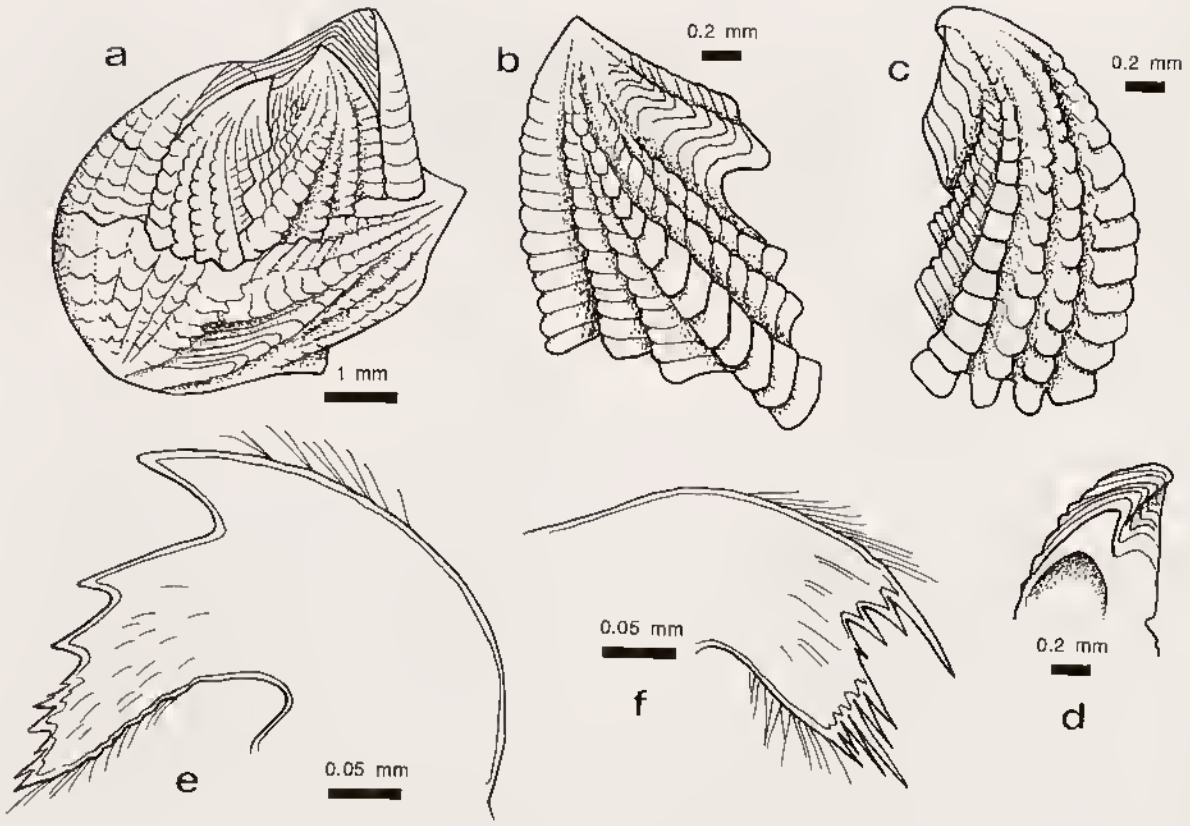

FIG. 15. — *Rostratoverruca kruegeri* (Broch, 1922) : **a**, complete shell (dorsal view), MNHN-Ci 2320; **b**, movable tergum (exterior); **c**, movable scutum (exterior); **d**, apical portion of movable scutum (interior); **e**, mandible; **f**, first maxilla. All material from KARUBAR, stn CP 46.

DISCUSSION. — This species is distinguished from *Rostratoverruca intexta* (Pilsbry, 1912) by the narrower movable plates, the number of ribs on the movable tergum and scutum, and the less prominent prow-like upper rib on the carina. It is similar to *Rostratoverruca koehleri* (Gruvel, 1907), but possesses a much more prominent apex on the fixed tergum, and greater ribbing on the occludent portion of the movable tergum.

DISTRIBUTION. — Western Pacific, 233-290 metres.

DISCUSSION

DISTRIBUTION. — The material studied was collected from depths ranging between 223 and 3680 metres. On the basis of this, a bathymetric zoning may be determined for the region, but it is likely that water temperatures and currents will also have a bearing on this distribution. The following provides a broad appreciation of the distribution of verrucid genera, and confirms that *Altiverruca*, in particular, is characteristic of slope and abyssal environments :

Genus	Depth range (metres)	Mean (metres)	No. of Stns
Altiverruca	412-3680	1407†	55
Metaverruca	240-2110	788	99
Verruca	466-620	542	2
Brochiverruca	356-700	520	6
Cameraverruca	380-450	415	2
Rostratoverruca	222-668	408	18

†only 2 specimens of *Altiverruca* were recovered from depths less than 510 metres.

Source : MNHN, Paris

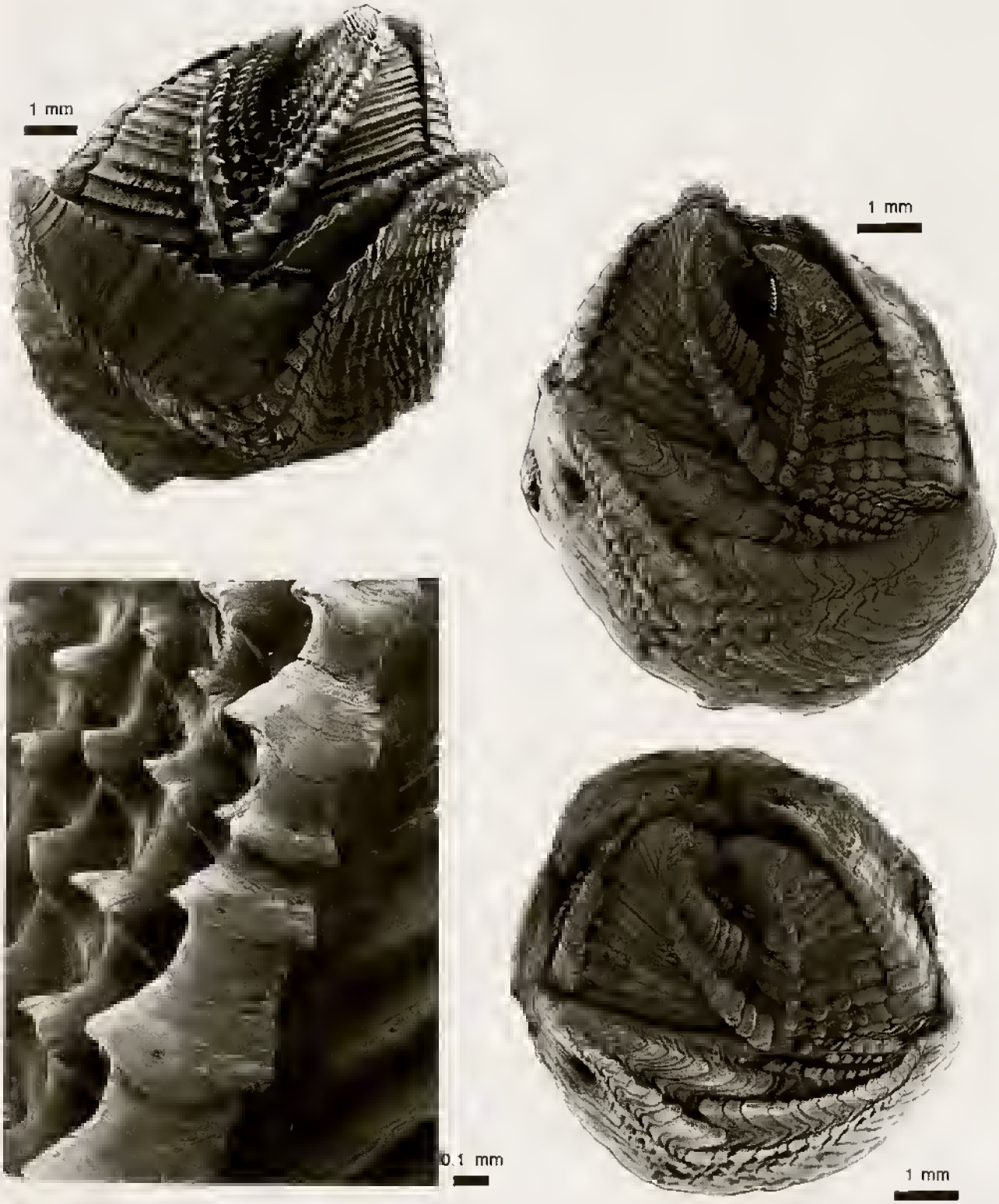

FIG. 16. — Scanning Electron Microscope views. : **a**, *Altiverruca navicula* (Hoek, 1913), complete shell, MNHN-Ci 2331; (dorsal view); **b**, *Altiverruca navicula* (Hoek, 1913), detail of apico-basal rib on movable tergum (exterior); **c**, *Metaverruca pacifica* sp. nov., complete shell (dorsi-frontal view), MNHN-Ci 2330; **d**, *Metaverruca pacifica* sp. nov., complete shell (dorsal view), MNHN-Ci 2330. Material : a-b, from KARUBAR, stn CP 91; c-d, from MUSORSTOM 5, stn CP 367.

Source : MNHN, Paris

Metaverruca recta was found to be the most abundant species in the region, being recorded from 55% of all stations collected; it was found associated with other verrucids at only 16 stations (24%). This collection also confirms *Metaverruca recta* as having the widest geographic, bathymetric and stratigraphic distribution of any verrucid.

ENDEMISM. — With the exception of *Metaverruca defayeae* (Loyalty, Wallis and Futuna Islands) all the new species here are presently restricted to the New Caledonian region. Whilst this is likely to be a function of incomplete collecting in other areas, it is worth noting that *Metaverruca*, presently represented by eight species world wide, has five of these species present in New Caledonian waters. The occurrence of the now cosmopolitan *Metaverruca recta* (also the earliest metaverrucid) from the Miocene of New Zealand suggests that the southwest Pacific is either a centre of reliction (NEWMAN, 1991), or throughout the Neogene was a centre for *Metaverruca* speciation.

SUBSTRATE. — Verrucids tend to be rather opportunistic in the choice of substrate, the most common being the abundant benthic debris, (generally small pebbles), found at many stations, although broken shell material has also been utilised. Some species appear to be host specific, in particular *Altiverruca navicula*, which was found attached to glass sponges in almost 80% of specimens, *Brochiverruca polystriata* and *Brochiverruca dens*, both found attached to coral in all cases, and *Rostratoverruca kruegeri*, always found attached to cidaroid spines.

ACKNOWLEDGEMENTS

The author wishes to thank Alain CROSNIER, ORSTOM (Institut Français de Recherche Scientifique pour le Développement en Coopération), for the invitation to work on the MUSORSTOM collections, for providing access to the material, and for providing a stimulating working environment. Joseph POUPIN, SMCB (Service Mixte de Contrôle Biologique des Armées) and Danielle DEFAYE (Muséum national d'Histoire naturelle, Paris), provided valuable assistance during the research project. This project was supported by a grant from the Muséum national d'Histoire naturelle.

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Source : MNHN, Paris

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Source : MNHN, Paris

Source : MNHN, Paris

5

Crustacea Amphipoda : Lysianassoids from the tropical western South Pacific Ocean

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ABSTRACT

There are currently 20 lysianassoid amphipod species known from the tropical western South Pacific Ocean. We report on 32 species from the area, including one new genus (*Coriolisa*) and 19 new species (*Aristias thio, A. uokonia, Bathyamaryllis ouvea, Clepidecrella tropicalis, Coriolisa novacaledonia, Cyphocaris bellona, Hippomedon vao, Kerguelenia koutoumo, K. lifou, Lepidepecreella sarcelle, Onesimoides abyssalis, Socarnes rurutu, S. tiendi, S. tuscarora, Socarnopsis honiara, S. tandai, Trischizostoma richeri, Tryphosella ama* and *T. oupi*). This brings the total species known from the area to 46.

RÉSUMÉ

Crustacea Amphipoda : Lysianassoides du Sud-Ouest Pacifique tropical.

Il est actuellement admis que 20 espèces d'amphipodes lysianassoides sont connues du Sud-Ouest Pacifique tropical. Nous traitons ici de 32 espèces trouvées dans cette région, comprenant un genre nouveau (*Coriolisa*) et 19 espèces nouvelles (*Aristias thio, A. uokonia, Bathyamaryllis ouvea, Clepidecrella tropicalis, Coriolisa novacaledonia, Cyphocaris bellona, Hippomedon vao, Kerguelenia koutoumo, K. lifou, Lepidepecreella sarcelle, Onesimoides abyssalis, Socarnes rurutu, S. tiendi, S. tuscarora, Socarnopsis honiara, S. tandai, Trischizostoma richeri, Tryphosella ama* et *T. oupi*). Ainsi le nombre total d'espèces connues de la région est porté à 46.

INTRODUCTION

Lysianassoid amphipods have never been considered as an important part of tropical ecosystems. The large work of SCHELLENBERG (1938) on the amphipods of the tropical Pacific Ocean reported only one lysianassoid

LOWRY, J. K. & STODDART, H. E., 1994. — Crustacea Amphipoda : Lysianassoids from the tropical western South Pacific Ocean. *In* : A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Volume 12. *Mém. Mus. nat. Hist. nat.*, **161** : 127-223. Paris ISBN 2-85653-212-8.

Source : MNHN, Paris

species, the comprehensive study of BARNARD (1970) on about 120 species of Hawaiian amphipods reported only one lysianassoid species and the monograph of MYERS (1985) on the amphipods of Fiji reported only two lysianassoid species from a total of 85 amphipod species. PIRLOT'S (1933, 1936) large accounts on amphipods from Indonesian waters reported 16 lysianassoid species. In the world monograph of BARNARD & KARAMAN (1991) lysianassoid amphipods were considered to be bipolar cold water submergents and not mentioned in the table of tropical families.

Recently LEDOYER (1986) reported 44 species of lysianassoids from the western Indian Ocean and LOWRY & STODDART (1993) recorded 22 lysianassoid species from Indonesian waters and 12 from the Philippines, significantly increasing the known diversity of both areas.

Only twenty species of lysianassoid amphipods are currently known from the tropical western South Pacific Ocean (for this study the area from the equator south to the Tropic of Capricorn and from the east coast of Australia to approximately 180°E). HASWELL (1879) described *Ichnopus tenuicornis* (as *Glycerina*), the first lysianassoid amphipod known from the Great Barrier Reef, Australia. No other lysianassoids were reported from this area until LOWRY & STODDART (1990, 1992) described *Wandin griffini* and *Ichnopus capricornus* and redescribed *I. tenuicornis*. STEBBING (1888) described *Cyclocaris tahitensis* from Tahitian waters and *Onesimoides carinatus* from the Coral Sea. SCHELLENBERG (1938) described one lysianassoid species, *Aristias tropicalis*, from the Bismarck Sea. BIRSTEIN & VINOGRADOV (1960), in their massive study of the pelagic gammaridean amphipods of the tropical Pacific Ocean, reported 22 lysianassoid species from the tropical Pacific Ocean. Seven of these species (*Bathycallisoma schellenbergi* Birstein & Vinogradov, 1958, *Cyphocaris anonyx* Boeck, 1871, *C. challengeri* Stebbing, 1888, *C. faurei* K.H. Barnard, 1916, *C. richardi* Chevreux, 1905a, *Ichnopus pelagicus* Schellenberg, 1926b and *Paracyphocaris brevicornis* Birstein & Vinogradov, 1955) occurred in pelagic waters of the western South Pacific between 152°E and 174°W and another seven species occurred just outside the area. From New Caledonia INTES (1978) reported *Eurythenes gryllus* (Lichtenstein, 1822), LEDOYER (1984) described *Parambasia acuticaudata* and LOWRY & STODDART (1992) described *Ichnopus annasona* and *I. malpatun*. REPELIN (1978), in his ecological study of the pelagic amphipods of the west and central Pacific, reported five species (also reported by BIRSTEIN & VINOGRADOV, 1960) from various localities north-east of New Caledonia (between 5°N and 20°S along 170°E) and in French Polynesia (along the equator between 135°W and 155°W and between Tahiti and the Marquesas Islands). MYERS (1985, 1986) described three species : *Parambasia nui* and *Parawaldeckia lowryi* from Fiji and *Parawaldeckia niua* from Tonga.

In this paper we report on 32 lysianassoid species from MUSORSTOM collections made in the waters around New Caledonia and the islands of Wallis and Futuna, and from Australian Museum collections made in the waters around the Austral Isles and the Solomon Islands. The total number of lysianassoid species now known from the tropical western South Pacific is 46.

It is obvious that the species list reflects collecting effort and is not a true representation of the lysianassoid fauna of the tropical western Pacific area. For instance five of the eight species from the Austral Isles are scavengers taken in baited traps, two species are pelagic predators taken in plankton tows and one species was taken among algae. There are no representatives of soft bottom dwellers (such as the pachynids), no species associated with other invertebrates (such as the aristiids), no ectoparasites (such as *Trischizostoma*) and no species of the wood-dwelling genus *Onesimoides*, so prevalent in other areas. The collection from New Caledonia is more representative of lysianassoid life-styles. Although scavenging lysianassoid genera such as *Orchomenella*, *Socarnes*, *Stephonyx*, *Tryphosella* and *Waldeckia* are represented, there has been no trapping in New Caledonian waters to give a more adequate estimate of the diversity. Invertebrate associates are represented by two species of *Aristias*, but it is reasonable to expect that some wandinid taxon is present in shallow lagoonal waters and some species of *Parawaldeckia* among reef rubble or algae. The pelagic oceanic areas studied by BIRSTEIN & VINOGRADOV (1960) and REPELIN (1978) are probably representative of the lysianassoid fauna, at least in the upper 150 m, but little is known of the abyssopelagic fauna. The only other areas from which lysianassoids are known (the Solomon, Wallis, Futuna, Fiji, Cook and Society Islands) are very poorly sampled.

On current information it is not possible to predict the species diversity of lysianassoid amphipods in the tropical western South Pacific Ocean or to compare the range of species known from there with adjacent areas such

Source : MNHN, Paris

as northern Australia or south-east Asia. However, it is becoming clear that lysianassoid amphipods are a diverse part of tropical ecosystems.

METHODS

Reports of the MUSORSTOM cruises which made these collections (including maps and station data) can be found in RICHER DE FORGES (1990, 1993). In 1991 one of us (JKL) visited the Service Mixte Contrôle Biologique des Armées (SMCB) in Tahiti and participated in a cruise on the R.V. *Marara* to the Austral Isles. Baited traps were set down to 900 m off each island in the group and in some cases in shallow water inside the lagoons. Plankton samples were collected off several islands using 1 m nets towed for 6 hours between 50 and 100 m depth. Shallow water samples of algae and sediment were taken by free diving at each island. A full report of this cruise is given in POUPIN (1991).

Taxonomic descriptions have been generated from the taxonomic data base program DELTA (DALLWITZ & PAINE, 1986). All new species names except *Clepidecrella tropicalis, Onesimoides abyssalis* and *Trischizostoma richeri* should be treated as nouns in apposition. Coded setal types on the mandibular palp follow the scheme presented by LOWRY & STODDART (1993). The codes used in the description of the spine-teeth on the outer plate of maxilla 1 are explained in LOWRY & STODDART (1992, 1993). Individual spine-teeth are labelled on the figures. Material is lodged in the Muséum national d'Histoire naturelle, Paris (**MNHN**), the Australian Museum, Sydney (**AM**) and the Pusat Penelitian dan Pengembangan Oseanologi, Djakarta (**PPPO**).

The following abbreviations are used on the plates : **A**, antenna; **E**, epistome and upper lip; **EP**, epimeron; **G**, gnathopod; **H**, head; **MD**, mandible; **MDP**, mandibular palp; **MP**, maxilliped; **MPIP**, maxilliped inner plate; **MPOP**, maxilliped outer plate; **MPP**, maxilliped palp; **MX**, maxilla; **MX1IP**, maxilla 1 inner plate; **MX1OP**, maxilla 1 outer plate; **MX1P**, maxilla 1 palp; **P**, peraeopod; **ST**, spine-tooth; **T**, telson; **U**, uropod; **UR**, urosome; **l**, left; **r**, right; **lat**, lateral.

LIST OF RECORDED SPECIES

Marquesas Islands

Orchomenella abyssorum (Stebbing, 1888).

Tuamotu Archipelago

Eurythenes cf. *gryllus* (Lichtenstein, 1822).

Society Islands

Cyclocaris tahitensis Stebbing, 1888
Parambasia nui Myers, 1985 (reported by MYERS, 1989).

Austral Isles

Cyclocaris tahitensis Stebbing, 1888.
Eurythenes cf. *gryllus* (Lichtenstein, 1822).
Ichnopus annasona Lowry & Stoddart, 1992.
Ichnopus pelagicus Schellenberg, 1926b (reported by LOWRY & STODDART, 1992).
Orchomenella gerulicorbis (Shulenberger & Barnard, 1976).
Parambasia acuticaudata Ledoyer, 1984.
Socarnes rurutu sp. nov.
Waldeckia sp. 1.

Source : MNHN, Paris

Cook Islands

Parambasia nui Myers, 1985 (reported by MYERS, 1990).

Tonga

Parawaldeckia mua Myers, 1986.

Wallis and Futuna Islands

Eurythenes cf. *gryllus* (Lichtenstein, 1822).
Onesimoides carinatus Stebbing, 1888.
Socarnes tuscarora sp. nov.

Fiji

Parambasia nui Myers, 1985.
Parawaldeckia lowryi Myers, 1985.

New Caledonia and the Loyalty Islands

Aristias thio sp. nov.
Aristias uokonia sp. nov.
Bathyamaryllis ouvea sp. nov.
Clepidecrella tropicalis sp. nov.
Coriolisa novacaledonia sp. nov.
Cyphocaris bellona sp. nov.
Eurythenes cf. *gryllus* (Lichtenstein, 1822) (reported by INTES, 1978).
Figorella tasmonica Lowry, 1984.
Hippomedon vao sp. nov.
Ichnopus annasona Lowry & Stoddart, 1992.
Ichnopus malpatun Lowry & Stoddart, 1992.
Kerguelenia koutoumo sp. nov.
Kerguelenia lifou sp. nov.
Lepidepecreella sarcelle sp. nov.
Onesimoides abyssalis sp. nov.
Orchomenella distinctus Birstein & Vinogradov, 1960.
Parambasia acuticaudata Ledoyer, 1984.
Procyphocaris indurata K.H. Barnard, 1925.
Socarnes tiendi sp. nov.
Stephonyx sp.
Trischizostoma richeri sp. nov.
Tryphosella ama sp. nov.
Tryphosella oupi sp. nov.

Chesterfield Islands

Cyphocaris bellona sp. nov.
Waldeckia sp. 2.

Coral Sea Basin

Onesimoides carinatus Stebbing, 1888.

Great Barrier Reef, Australia

Ichnopus capricornus Lowry & Stoddart, 1992.
Ichnopus tenuicornis (Haswell, 1879) (reported by LOWRY & STODDART, 1992).
Wandin griffini Lowry & Stoddart, 1990.

Source : MNHN, Paris

Solomon Islands

Socarnopsis honiara sp. nov.
Socarnopsis tandai sp. nov.

Bismarck Sea

Aristias tropicalis Schellenberg, 1938.

Central and Western South Pacific pelagics

Bathycallisoma schellenbergi Birstein & Vinogradov, 1958 (recorded by BIRSTEIN & VINOGRADOV, 1960).
Cyphocaris anonyx Boeck, 1871 (recorded by BIRSTEIN & VINOGRADOV, 1960, and REPELIN, 1978).
Cyphocaris challengeri Stebbing, 1888 (recorded by BIRSTEIN & VINOGRADOV, 1960, and REPELIN, 1978).
Cyphocaris faurei K.H. Barnard, 1916 (recorded by BIRSTEIN & VINOGRADOV, 1960, and REPELIN, 1978).
Cyphocaris richardi Chevreux, 1905a (recorded by BIRSTEIN & VINOGRADOV, 1960, and REPELIN, 1978).
Ichnopus pelagicus Schellenberg, 1926b [recorded by BIRSTEIN & VINOGRADOV, 1960 (as *Socarnes longicornis*), and REPELIN, 1978].
Paracyphocaris brevicornis Birstein & Vinogradov, 1955 (recorded by BIRSTEIN & VINOGRADOV, 1960).

SYSTEMATICS

Genus *ARISTIAS* Boeck, 1871

Aristias thio sp. nov.

Figs 1-3

MATERIAL EXAMINED. — **New Caledonia.** CALSUB : stn PL 13, 21°26'S, 166°22.7'E, east of Thio, 1567-1807 m, 4 March 1989 : 1 ♀, 14.4 mm, with non-setose oostegites (MNHN-Am 4485).

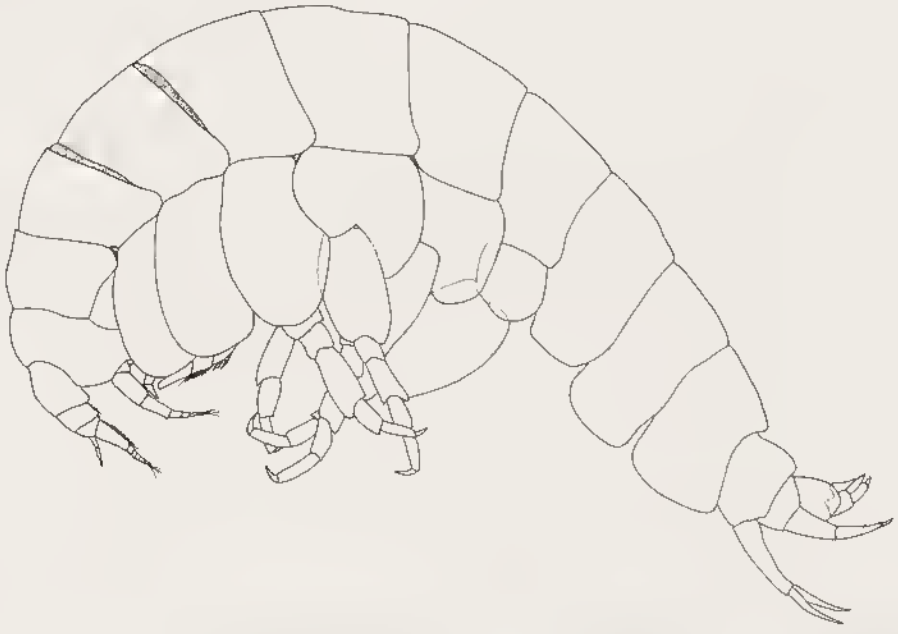

FIG. 1. — *Aristias thio* sp. nov., holotype female, 14.4 mm (MNHN-Am 4485), off Thio, New Caledonia.

Source : MNHN, Paris

TYPES. — The unique specimen is the holotype.

TYPE LOCALITY. — East of Thio, New Caledonia, 21°26'S, 166°22.7'E, 1567 to 1807 m.

DIAGNOSIS. — Eyes apparently absent. Antenna 1 : accessory flagellum 3-articulate. Mandible : incisors asymmetrical, left with minutely serrate margin: left lacinia mobilis a short, smooth peg. Maxilla 1 : outer plate with 7 spine-teeth, 5 in outer row and 2 in inner row; inner plate with 6 plumose setae along inner margin. Gnathopod 1 : parachelate; coxa vestigial. Peracopods 5 and 6 : coxae strongly lobate posteriorly. Peracopods 3 to 7 : propodus without distal spurs. Epimeron 3 : posteroventral corner narrowly rounded. Uropod 3 : outer ramus with short article 2. Telson moderately cleft (49%).

DESCRIPTION. — Based on holotype female, 14.4 mm; male not known. *Head* : exposed, deeper than long; lateral cephalic lobe large, broadly rounded; rostrum absent; eyes apparently absent. *Antenna 1* : short, 0.14 times

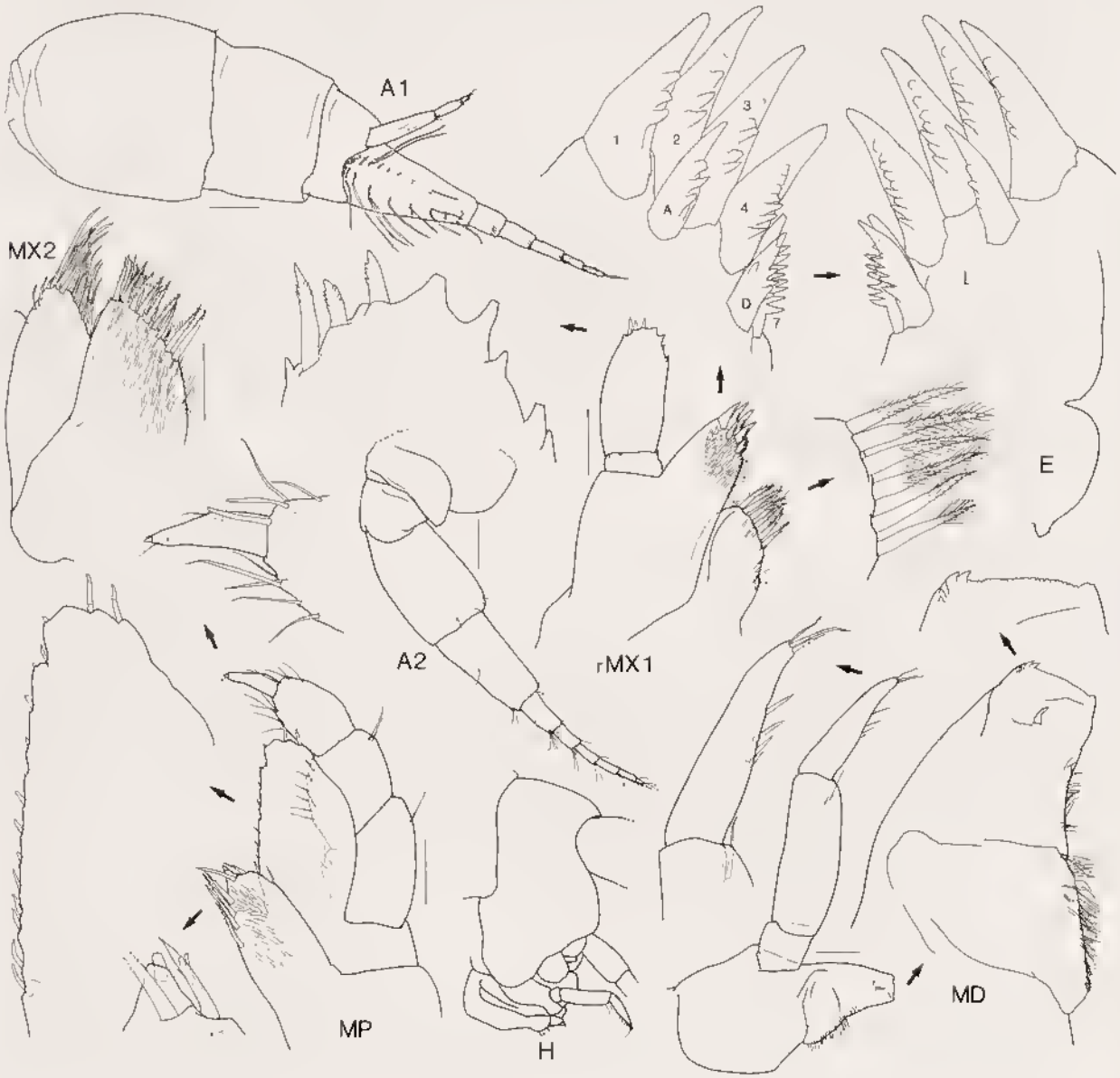

FIG. 2. — *Aristias thio* sp. nov., holotype female, 14.4 mm (MNHN-Am 4485), off Thio, New Caledonia. Scales represent 0.1 mm.

Source : MNHN, Paris

body; peduncular article 1 short, length 1.1 times breadth; peduncular article 2 long, 0.6 times article 1, without anterodistal projection; peduncular article 3 long, 0.37 times article 1; accessory flagellum medium length, 0.39 times primary flagellum, 3-articulate, article 1 long, 2.3 times article 2; flagellum 6-articulate, with weak 2-field callynophore in female without setae or spines. *Antenna 2* : slightly longer than antenna 1; weakly geniculate between peduncular articles 3-4, article 3 short, 0.43 times article 4; flagellum well developed, 6-articulate.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : fused, with central notch. *Mandible* : incisors asymmetrical, large with straight margins, left with minutely serrate margin; left lacinia mobilis present, a short smooth peg; without accessory spines or intermediate setae; molar a reduced setose flap; mandibular palp attached midway; article 1 short, length 1 times breadth; article 2 slender, length 2.6 times breadth, 1.2 times article 3, with 2 submarginal posterodistal A2-setae, without D2-setae; article 3 slender, distally truncate, long, length 4.2 times breadth, without A3-setae, with 4 proximal D3-setae and 3 apical E3-setae. *Maxilla 1* : inner plate tapering distally, at least half of inner margin setose, with 5-6 plumose setae; outer plate broad with 7 spine-teeth in two rows; outer row with ST1 to ST3 large, stout, multicuspidate, ST4 large, slender multicuspidate, ST5-ST6 absent, ST7 large, broad, 9-cuspidate; inner row with STA large, slender, 4-cuspidate, STB-STC absent, STD short, broad, 4-cuspidate; palp large, 2-articulate, with 2 long terminal spines, without subterminal setae, flag spine present, distomedial margin serrate. *Maxilla 2* : inner plate broad, outer plate narrow, inner plate 1 times length outer plate. *Maxilliped* : inner plate large, subrectangular, with 1 apical nodular spine, oblique setal row reduced, with 6 plumose setae; outer plate small, subovate, with 2 apical simple setae, without apical spines, medial spines present, small, submarginal setae absent; palp large, 4-articulate; article 2 very broad, length 1 times breadth, 1.1 times article 3; article 3 short, broad, length 1.5 times breadth; dactylus well developed, with 1 subterminal seta, unguis present.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : parachelate; coxa vestigial; basis long, slender, length 2.5 times breadth, anterior margin smooth, without setae; ischium short, length 1 times breadth; merus, posterior margin with group of long simple setae and patch of short setae; carpus wedge-shaped, produced dorsally, short, length 1.5 times breadth and 1 times propodus, with patch of very fine setae near posterior margin and long simple setae along posterior margin; propodus large, subtriangular, length 1.8 times breadth, tapering distally, posterior margin serrate, convex, with 5 spines, without denticulate patch near posterior margin, palm slightly acute, with straight, minutely serrate margin, posterodistal corner with 1 medial spine; dactylus simple, with serrate posterior margin. *Gnathopod 2* : minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 2.1 times breadth; carpus long, length 3.4 times breadth, posterior margin straight; propodus subrectangular, long, length 2.6 times breadth, palm transverse, with straight, serrate margin, posterodistal corner with 1 medial and 1 lateral spines; dactylus not reaching corner of palm, posterior margin smooth.

Peraeopod 3 : coxa large; merus weakly expanded anteriorly; propodus without minutely denticulate surface, posterodistal spur, setae or spines; dactylus short, slender. *Peraeopod 4* : coxa deeper than wide, with weak posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus weakly expanded anteriorly; propodus without minutely denticulate surface, posterodistal spur, setae or spines; dactylus short, slender. *Peraeopod 5* : coxa bilobate, posterior lobe strongly produced ventrally; basis weakly expanded, posterior margin straight; merus not expanded posteriorly; propodus without minutely denticulate surface, anterodistal spur, setae or spines; dactylus short, slender. *Peraeopod 6* : coxa small, strongly lobate posteriorly; basis weakly expanded, with slightly rounded smooth margin, without anteroventral lobe; merus not expanded posteriorly; propodus without minutely denticulate surface or anterodistal spur, posterior margin without spines; dactylus short, slender. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, smooth, posteroventral corner rounded, posteroventral margin straight; merus with anterior and posterior margins subparallel; propodus with minutely denticulate surface, without anterodistal spur or spines; dactylus short, slender.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* : from gnathopod 2 to peraeopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner rounded. *Epimeron 3* : posteroventral corner narrowly rounded. *Urosomites* : dorsally smooth. *Uropod 1* : peduncle with 2 dorsolateral and 1 apicolateral spines; rami subequal in length, outer ramus with 1 lateral and 3 medial spines; inner ramus with 2 lateral spines. *Uropod 2* : with 1 apicolateral and 1 apicomedial spines, without spines along distal margin; rami subequal in length, outer ramus without spines; inner ramus with 1 lateral spine, without constriction or proximal flange.

Source : MNHN, Paris

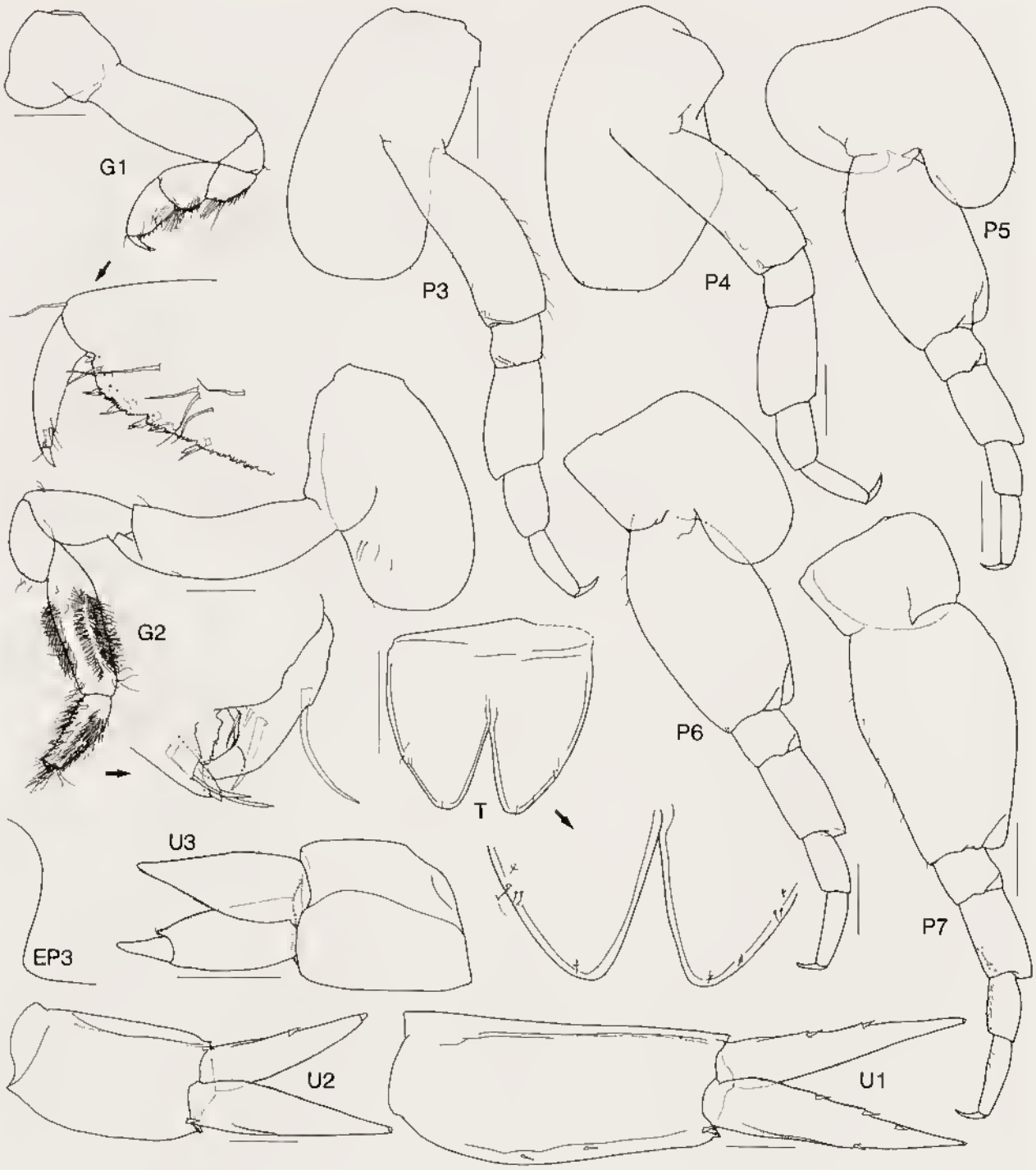

FIG. 3. — *Aristias thio* sp. nov., holotype female, 14.4 mm (MNHN-Am 4485), off Thio, New Caledonia. Scales represent 0.2 mm.

Uropod 3 : peduncle short, length 1.4 times breadth, without dorsolateral flange, without dorsal spines, midlateral spines or setae or distoventral spines; rami lanceolate, inner ramus reduced, about 0.9 times outer ramus, outer ramus 2-articulate, article 2 short, rami without spines. *Telson* : shorter than broad, length 0.85 times breadth, moderately cleft (49%), without dorsal spines or dorsal setae, distal margins rounded, without marginal penicillate setae, with 2 simple marginal setae on each lobe, without marginal spines.

Source : MNHN, Paris

ETYMOLOGY. — Named for the town of Thio, near the type locality.

REMARKS. — *Aristias thio* has no eyes, only 3 articles on the accessory flagellum of antenna 1, no distal spurs on the peraeopods and the inner ramus of uropod 3 is nearly as long as the outer. *Aristias coriolis* Lowry & Stoddart, 1993, also has these character states, but it differs from *A. thio* in having more spine-teeth on the outer plate of maxilla 1, apically acute posteroventral lobes on the coxae of peraeopods 5 and 6 and a more deeply cleft telson. One other species, *A. expers* J.L. Barnard, 1967, shares all of these character states, except the inner ramus of uropod 3, which just reaches the end of article 1. It differs further from *A. thio* in having a differently shaped posterior margin on the propodus of gnathopod 1, a differently shaped basis on peraeopod 7 and a slightly less cleft telson.

DISTRIBUTION. — *Aristias thio* is known only from south-eastern New Caledonia in 1800 m depth.

Aristias uokonia sp. nov.

Figs 4-6

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn DW 33, 23°09.71'S, 167°10.27'E to 23°10.80'S, 167°10.45'E, south of the Isle of Pines, 675-680 m, 29 August 1985 : 1 ♀, 16.2 mm, with setose oostegites (MNHN-Am 4430).

TYPES. — The unique specimen is the holotype.

TYPE LOCALITY. — South of the Isle of Pines, New Caledonia, 23°09.71'S, 167°10.27'E to 23°10.80' S, 167°10.45'E, 675 to 680 m.

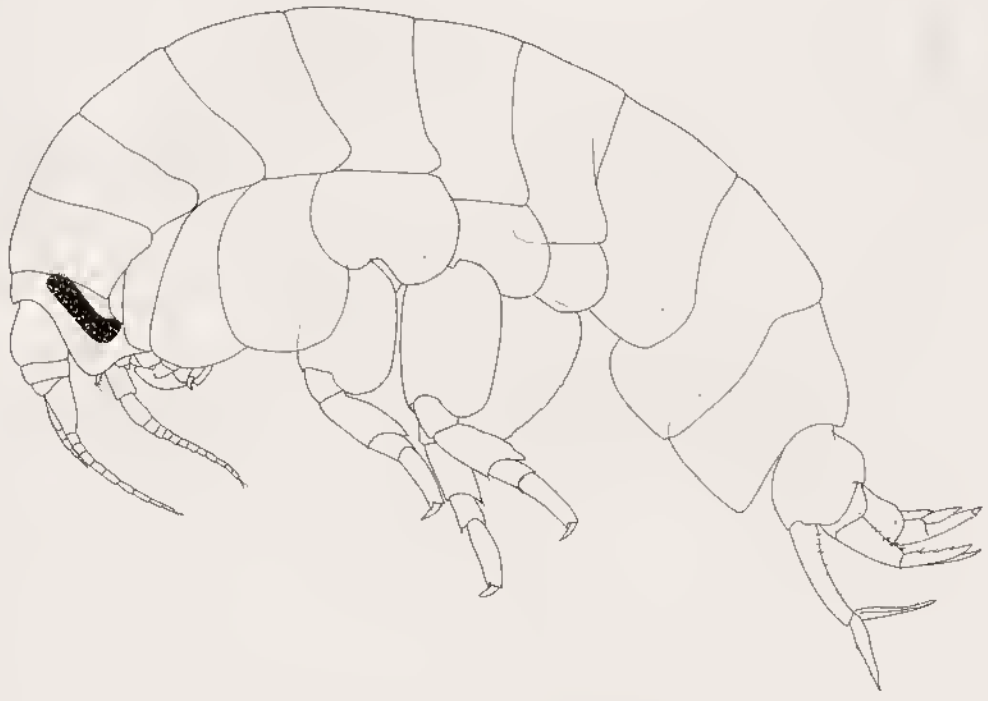

FIG. 4. — *Aristias uokonia* sp. nov., holotype female, 16.2 mm (MNHN-Am 4430), south of the Isle of Pines, New Caledonia.

DIAGNOSIS. — Eyes long, narrow, subsigmoid. Antenna 1 : accessory flagellum 6-articulate. Mandible : incisors symmetrical, with straight, smooth margins; left lacinia mobilis a small spine. Maxilla 1 : outer plate

Source : MNHN, Paris

with 13 spine-teeth, 11 in outer row and 2 in inner row; inner plate with 10 plumose setae along inner margin. Gnathopod 1 : parachelate; coxa vestigial. Peracopods 5 and 6 : coxa 5, posterior lobe weakly produced ventrally; coxa 6 strongly lobate posteriorly. Peraeopods 3 to 7 : propodus with distal spurs. Epimeron 3 : posteroventral corner narrowly rounded. Uropod 3 : inner ramus shorter than article 1 of outer ramus; outer ramus with short article 2. Telson deeply cleft (72%).

DESCRIPTION. — Based on holotype female, 16.2 mm; male not known. *Head* : exposed, deeper than long; lateral cephalic lobe large, narrowly rounded; rostrum absent; eyes long, narrow, subsigmoid, brown in alcohol.

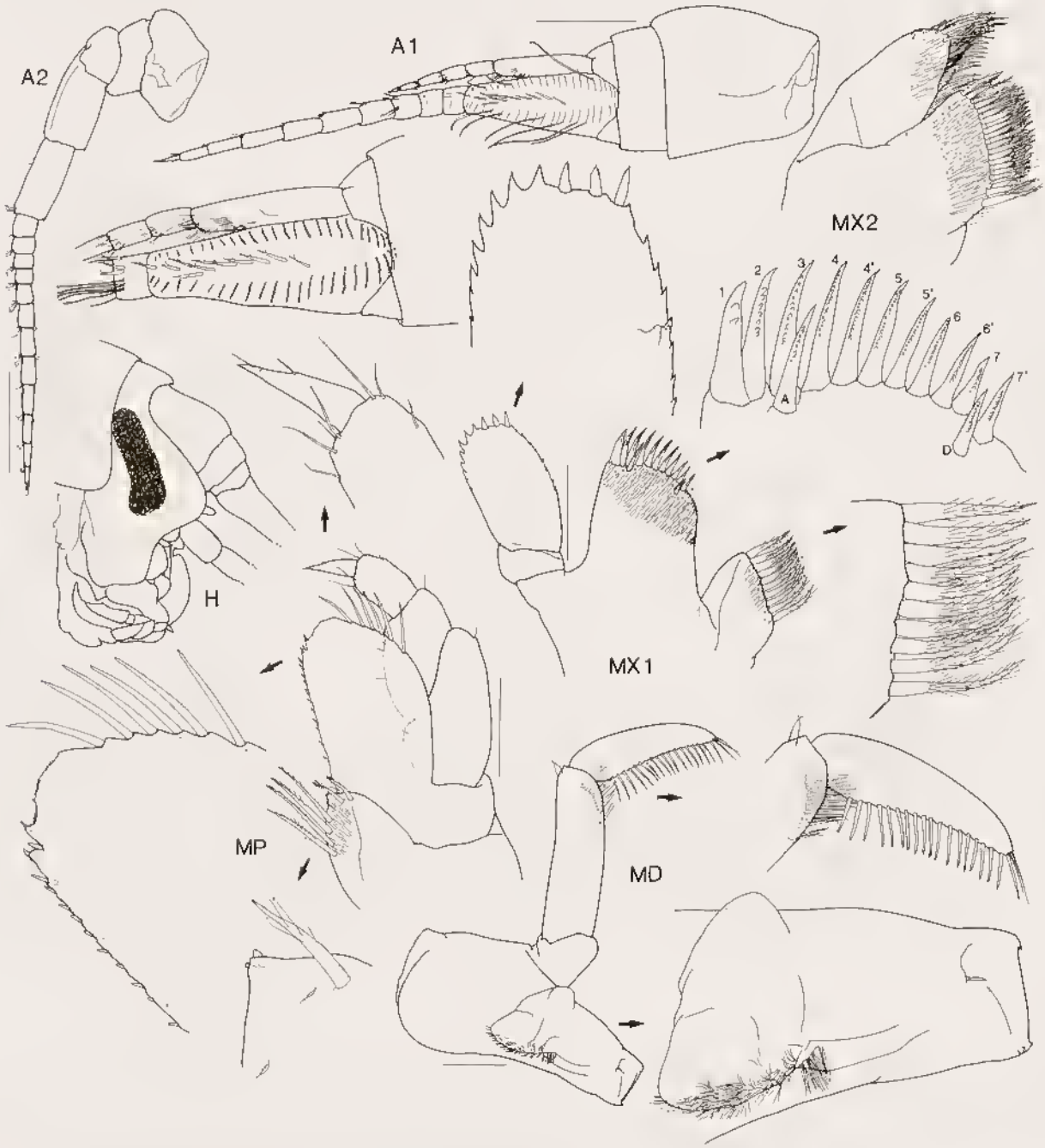

FIG. 5. — *Aristias uokonia* sp. nov., holotype female, 16.2 mm (MNHN-Am 4430), south of the Isle of Pines, New Caledonia. Scales for A1 and A2 represent 0.5 mm, remainder represent 0.2 mm.

Source : MNHN, Paris

Antenna 1 : medium length, 0.22 times body; peduncular article 1 short, length 1.2 times breadth; peduncular article 2 short, 0.25 times article 1, without anterodistal projection; peduncular article 3 long, 0.25 times article 1; accessory flagellum, medium length, 0.46 times primary flagellum, 6-articulate, article 1 long, 3.4 times article 2; flagellum 11-articulate, with strong 2-field callynophore with 11 large midmedial spines. *Antenna 2* : slightly longer than antenna 1; weakly geniculate between peduncular articles 3-4, article 3 short, 0.35 times article 4; flagellum well developed, 13-articulate.

Mouthpart bundle: subquadrate. *Epistome* and *upper lip* : fused, with central notch. *Mandible* : incisors symmetrical, large, with straight margins; left lacinia mobilis present, a small spine; without accessory spines or intermediate setae; molar a small, smooth flap with setose margins; mandibular palp attached midway; article 1 short, length 1 times breadth; article 2 slender, length 3.3 times breadth, 1.2 times article 3, with 13 submarginal posterodistal A2-setae, without D2-setae; article 3 falcate, long, length 3.5 times breadth, without A3-setae, with 19 D3-setae along most of posterior margin and 3 apical E3-setae. *Maxilla 1* : inner plate tapering distally, inner margin fully setose, 10 plumose setae; outer plate extremely broad with 13 spine-teeth in two rows; outer row with ST1 to ST3 large, slender, multicuspidate, 6 spine-teeth from ST4 to ST7 all large, slender, multicuspidate; inner row with STA large, slender, multicuspidate, STB-STC absent, STD long, slender, multicuspidate; palp large, 2-articulate, with 2 short terminal spines, without subterminal setae, flag spine present on distolateral corner, distomedial and distolateral margins serrate. *Maxilla 2* : inner plate broad, outer plate narrow, inner plate 1 times length outer plate. *Maxilliped* : inner plate small, subovate, with 2 apical nodular spines, oblique setal row strong with 6 plumose setae; outer plate medium size, subrectangular, with 6 apical simple setae, without apical spines, medial spines present, small, submarginal setae absent; palp large, 4-articulate; article 2 very broad, length 1.4 times breadth, 1.6 times article 3; article 3 short, broad, length 1.6 times breadth; dactylus well developed, with 2 subterminal setae, unguis absent.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : parachelate; coxa vestigial; basis long, slender, length 3.8 times breadth, anterior margin smooth, with simple setae; ischium short, length 1.1 times breadth; merus, posterior margin with group of long simple setae and patch of short setae; carpus subrectangular, short, length 1.6 times breadth, longer than (1.2 times) propodus, with patch of very fine setae near posterior margin and long simple setae along posterior margin; propodus large, subtriangular, length 1.6 times breadth, tapering distally, posterior margin serrate, subtly sinusoidal, with 4 spines, without denticulate patch near posterior margin, palm transverse, margin convex, serrate, posterodistal corner with 1 medial spine; dactylus simple, without subterminal teeth or spines. *Gnathopod 2* : minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.1 times breadth; carpus long, length 3.7 times breadth, posterior margin straight; propodus subrectangular, long, length 2.6 times breadth, palm transverse, with concave, minutely serrate margin, posterodistal corner without spines; dactylus over-reaching corner of palm, posterior margin smooth.

Peraeopod 3 : coxa large; merus weakly expanded anteriorly; propodus without minutely denticulate surface, with small posterodistal spur, with 3 setae and 1 distal spine along posterior margin; dactylus short, stocky. *Peraeopod 4* : coxa deeper than wide, with weak posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus weakly expanded anteriorly; propodus without minutely denticulate surface, with small posterodistal spur, with 2 setae and 1 distal spine along posterior margin; dactylus short, stocky. *Peraeopod 5* : coxa bilobate, posterior lobe slightly produced ventrally; basis expanded with posterior margin smooth; merus slightly expanded posteriorly; propodus without minutely denticulate surface, with small anterodistal spur, with 1 distal spine along anterior margin; dactylus short, stocky, *Peraeopod 6* : coxa large, strongly lobate posteriorly; basis expanded posteriorly with smooth posterior margin, without anteroventral lobe; merus slightly expanded posteriorly; propodus without minutely denticulate surface, with small anterodistal spur, with 1 distal spine along anterior margin; dactylus short, stocky. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus slightly expanded proximally with slightly rounded posterior margin with 5 spines; propodus without minutely denticulate surface, with small anterodistal spur, with 3 spines and 1 distal spine along anterior margin and 3 setae along posterior margin; dactylus short, stocky.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* : from gnathopod 2 to peraeopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner narrowly rounded. *Epimeron 3* : posteroventral corner narrowly rounded. *Urosomites* : dorsally smooth. *Uropod 1* : peduncle with 7 dorsolateral,

Source : MNHN, Paris

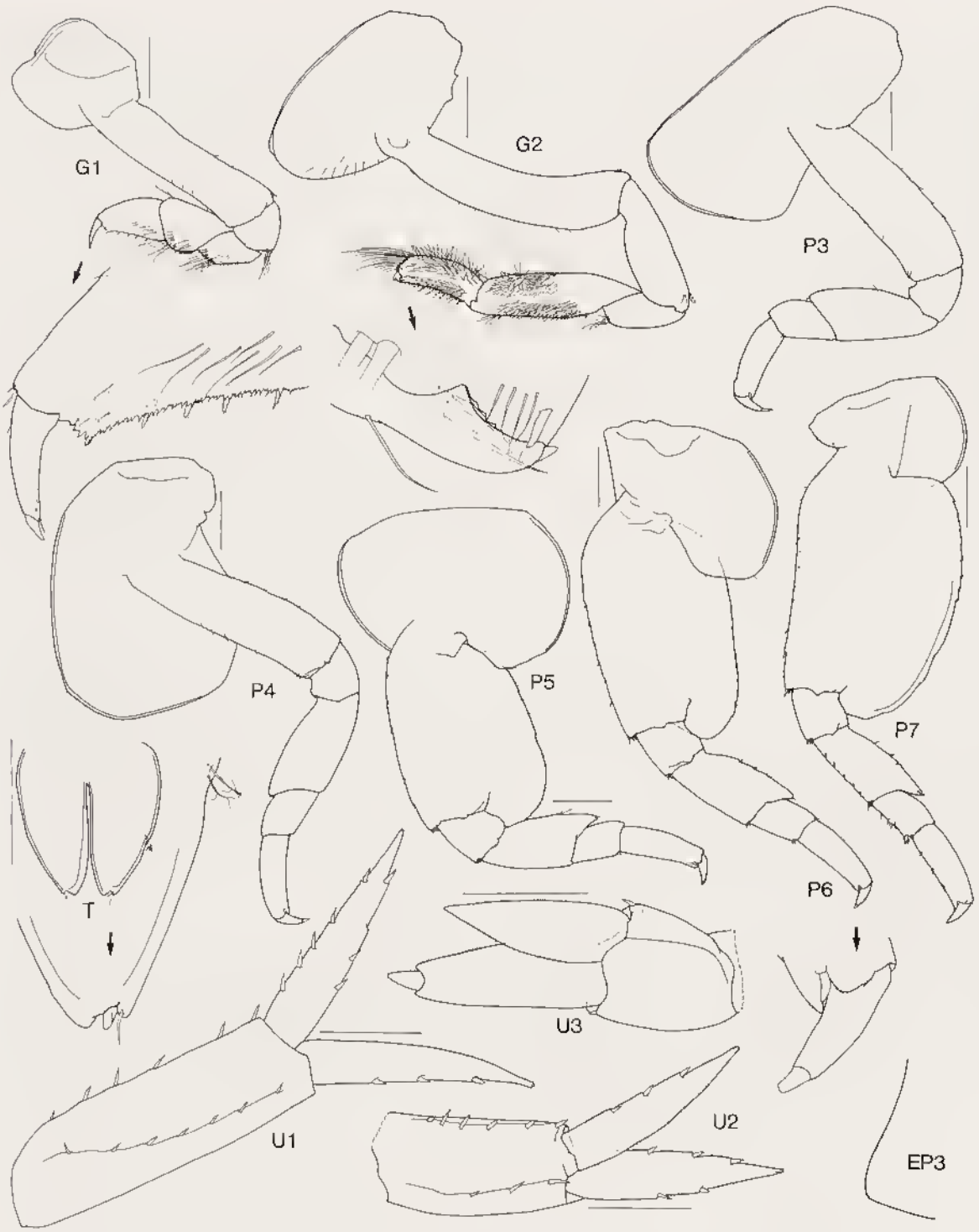

FIG. 6. — *Aristias uokonia* sp. nov., holotype female, 16.2 mm (MNHN-Am 4430), south of the Isle of Pines, New Caledonia. Scales represent 0.5 mm.

5 dorsomedial and 1 apicomedial spines; rami subequal in length, outer ramus with 3 lateral spines; inner ramus with 4 medial and 5 lateral spines. *Uropod 2* : with 5 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial spines, without spines along distal margin; rami subequal in length, outer ramus with 3 lateral spines in weak

Source : MNHN, Paris

acclivities; inner ramus with 3 medial and 2 lateral spines, inner ramus without constriction or proximal flange. *Uropod 3* : peduncle short, length 1.5 times breadth, without dorsolateral flange, with 1 apicomedial spine, without midlateral spines or setae, with 1 distoventral spine; rami lanceolate, inner ramus reduced, about 0.77 times outer ramus, outer ramus 2-articulate, article 2 short, rami without spines. *Telson* : longer than broad, length 1.1 times breadth, deeply cleft (72%), without dorsal spines or dorsal setae, distal margins truncated, without marginal penicillate setae, with 1 simple marginal seta and 1 marginal spine on each lobe.

ETYMOLOGY. — Named for Point Uokonia, Isle of Pines, near the type locality.

REMARKS. — This is the first record of midmedial spines on the face of the callynophore in lysianassoid amphipods. As far as we know these spines distinguish *A. uokonia* from all other aristiids. *Aristias uokonia* has the inner ramus of uropod 3 reduced. Other species with this character state include the Pacific and Indian Ocean species *A. adrogans* J.L. Barnard, 1964a, *A. expers* J.L. Barnard, 1967, *A. stenopodus* Ledoyer, 1986, and the North Atlantic species *A. tumidus* (Krøyer, 1846). *Aristias adrogans* and *A. stenopodus* differ from does *A. uokonia* in having imperfectly developed eyes or none at all. Neither *A. adrogans* nor *A. expers* has the telson as deeply cleft as *A. uokonia*, both have differently shaped posterior margins on the propodus of gnathopod 1 and *A. expers* has no spurs on the peraeopods. *Aristias stenopodus* has a deeply cleft telson, but it is much wider than long and the bases of peraeopods 5 to 7 are not as well developed. *Aristias tumidus* differs from *A. uokonia* in having a differently shaped eye, fewer spine-teeth on the outer plate of maxilla 1 and a better developed posteroventral lobe on coxa 5.

DISTRIBUTION. — *Aristias uokonia* is known from south of the Isle of Pines, New Caledonia, in 680 m depth.

Genus *BATHYAMARYLLIS* Pirlot, 1933

Bathyamaryllis ouvea sp. nov.

Figs 7-10

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 44, 22°47.30'S, 167°14.30'E to 22°47.35'S, 167°14.50'E, south of the Isle of Pines, 440-450 m, 30 August 1985 : 1 ♀, 7.8 mm, ovigerous, 7 eggs (MNHN-Am 4775); 1 ♂, 7.7 mm (MNHN-Am 4776); 28 specimens (MNHN-Am 4382); 25 specimens (AM P42124). — Stn DW 46, 22°53.05'S, 167°17.08'E to 22°53.27'S, 167°17.41'E, south of the Isle of Pines, 570-610 m, 30 August 1985 : 55 specimens (MNHN-Am 4441). — Stn DW 51, 23°05.27'S, 167°44.95'E, south of the Isle of Pines, 680-700 m, 31 August 1985 : 6 specimens (MNHN-Am 4442). — Stn DW 77, 22°15.32'S, 167°15.40'E, north-west of the Isle of Pines, 440 m, 5 September 1985 : 1 ♂, 8.0 mm, 1 ♂, immature (MNHN-Am 4793). — Stn DW 104, 21°30.62'S, 166°21.26'E to 21°30.95'S, 166°21.55'E, north-east of Thio, 375-450 m, 8 September 1985 : 1 specimen (MNHN-Am 4463).

TYPES. — The female specimen (from MNHN-Am 4775) is the holotype, the other specimens are paratypes.

TYPE LOCALITY. — South of the Isle of Pines, New Caledonia, 22°47.30'S, 167°14.30'E to 22°47.35'S, 167°14.50'E, 440 to 450 m.

DIAGNOSIS. — Antenna 1 : peduncular article 2, 0.5 times as long as article 1. Antenna 2 : peduncular article 4 and 5, each 3 times as long as wide. Uropod 2 : outer ramus about 0.7 times as long as inner ramus; inner ramus with 5 medial spines and 6,1 lateral spines.

DESCRIPTION. — Based on holotype female 7.8 mm (MNHN-Am 4775); paratype male, 8.0 mm (MNHN-Am 4793). *Head* : exposed, much deeper than long, extending below insertion of antenna 2 with indentation at level of insertion; lateral cephalic lobe moderate, rounded; rostrum moderate; eyes long, oval (very faint in alcohol). *Antenna 1* : elongate, 0.38 times body; peduncular article 1 long, length 2.2 times breadth, bell-shaped proximally, without dorsal crest, with large midmedial tooth, without posterodistal tooth, without anterodistal projection; peduncular article 2 long, 0.5 times article 1, without anterodistal projection; peduncular article 3 long.

Source : MNHN, Paris

0.25 times article 1; accessory flagellum short, 0.25 times primary flagellum, 5-articulate (male 7), article 1 short, 1.5 times article 2 (male long, 2.5 times article 2); flagellum 22-articulate (male 21-articulate), without callynophore in female (strong 2-field in male); calceoli absent in female and male. *Antenna 2* : slightly longer than antenna 1; peduncle without brush setae in female (weak in male), female weakly geniculate between peduncular articles 3-4, article 3 short, 0.29 times article 4; flagellum well developed, 23-articulate (male at least 13, damaged); calceoli absent in female and male.

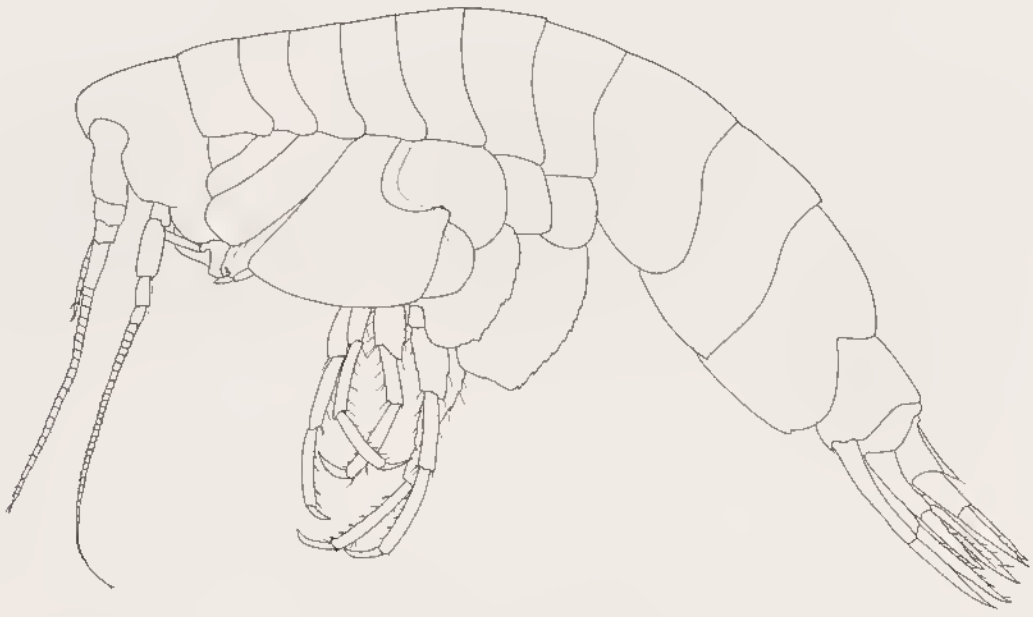

FIG. 7. — *Bathyamaryllis ouvea* sp. nov., paratype male, 7.7 mm (MNHN-Am 4776), south of the Isle of Pines, New Caledonia.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : fused, with central bulge. *Mandible* : incisors symmetrical, small, with slightly convex margins; left lacinia mobilis present, a stemmed distolaterally cusped blade; accessory spine row with large distal setal tuft, left and right rows each with 10 long, slender, serrate spines, with "whip-like" intermediate setae; molar a small, smooth flap with setose margins; mandibular palp attached midway; article 1 short, length 1.2 times breadth; article 2 slender, length 4.7 times breadth, 1.6 times article 3, without A2-setae in female (male 14 - 16), without D2-setae; article 3 tapering distally, short, length 2.8 times breadth, without proximal A3-setae in female (male 1), with 4 distal D3-setae (male 11 - 12) and 2 apical E3-setae. *Maxilla 1* : inner plate broad with 2 plumose apical setae; outer plate broad with 11 spine-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, weakly cuspidate, ST4 large, stout, 4-cuspidate, ST5 large, stout, 5-cuspidate, ST6 large, stout, 9-cuspidate, ST7 contiguous with ST6, large, slender, 17-cuspidate medially; inner row with STA large, slightly displaced from STB, 3-cuspidate, STB large, broad, 4-cuspidate, STC large, broad, 5-cuspidate, STD broad, smaller than STC, 4-cuspidate; palp absent. *Maxilla 2* : inner and outer plates narrow, inner plate bulging proximomedially, inner plate 1 times length outer plate. *Maxilliped* : inner plate large, subrectangular, with 3 apical vestigial nodular spines, oblique setal row reduced with 7 plumose setae; outer plate medium size, subovate, without subapical notch, without apical setae or spines, without medial spines, submarginal setae vestigial; palp large, 4-articulate; article 2 slender, length 2.5 times breadth, 1.4 times article 3; article 3 long, slender, length 2.4 times breadth; dactylus reduced, with 1 terminal and 1 subterminal seta, unguis absent.

Peraeonites : 1 to 7 dorsally smooth; peraeonite 6 without sternal hook. *Gnathopod 1* : simple; coxa vestigial; basis very long, slender, length 6.4 times breadth, anterior margin smooth, with simple setae; ischium long, length 1.7 times breadth; merus, posterior margin lined with long simple setae; carpus subrectangular, long,

Source : MNHN, Paris

length 2.6 times breadth and 1 times propodus, without denticulate patch near posterodistal margin; propodus large, subrectangular, length 2.6 times breadth, margins slightly converging distally, posterior margin serrate, straight, with 4 spines and 4 groups of setae, without disto-medial setae, without denticulate patch near posterior margin, palm absent; dactylus simple, with serrate posterior margin. *Gnathopod 2* : subchelate; coxa reduced, partially covered by coxa 3; ischium long, length 3,2 times breadth; carpus very long, length 6.2 times breadth, posterior margin straight; propodus subrectangular, long, length 2.6 times breadth, palm acute, with straight, serrate margin, posterodistal corner with 1 medial spine; dactylus reaching corner of palm, posterior margin serrate.

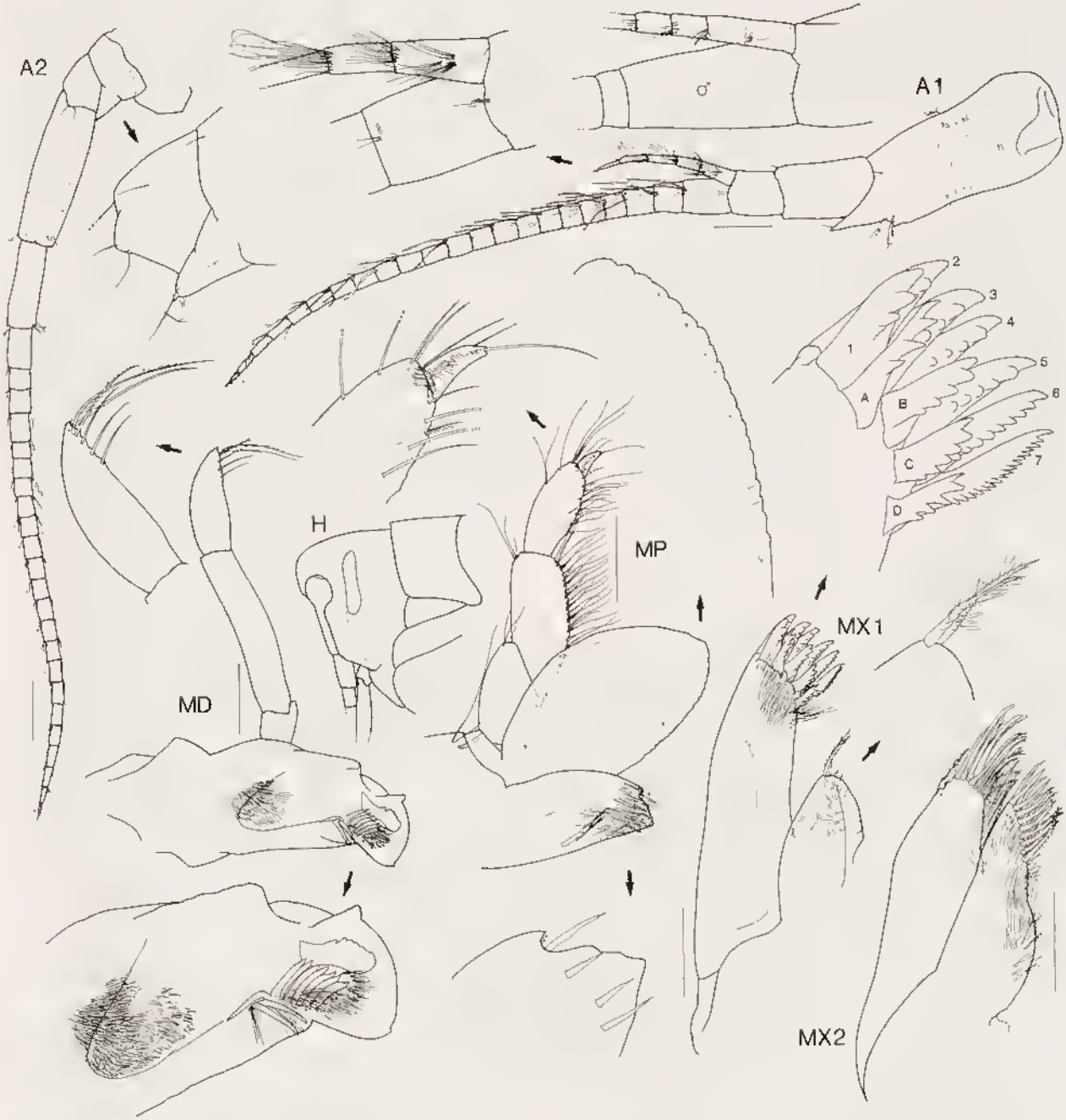

FIG. 8. — *Bathyamaryllis ouvea* sp. nov., holotype female, 7.8 mm (MNHN-Am 4775); paratype immature male, 7.7 mm (MNHN-AM 4776); south of the Isle of Pines, New Caledonia. Scales represent 0.1 mm.

Source : MNHN, Paris

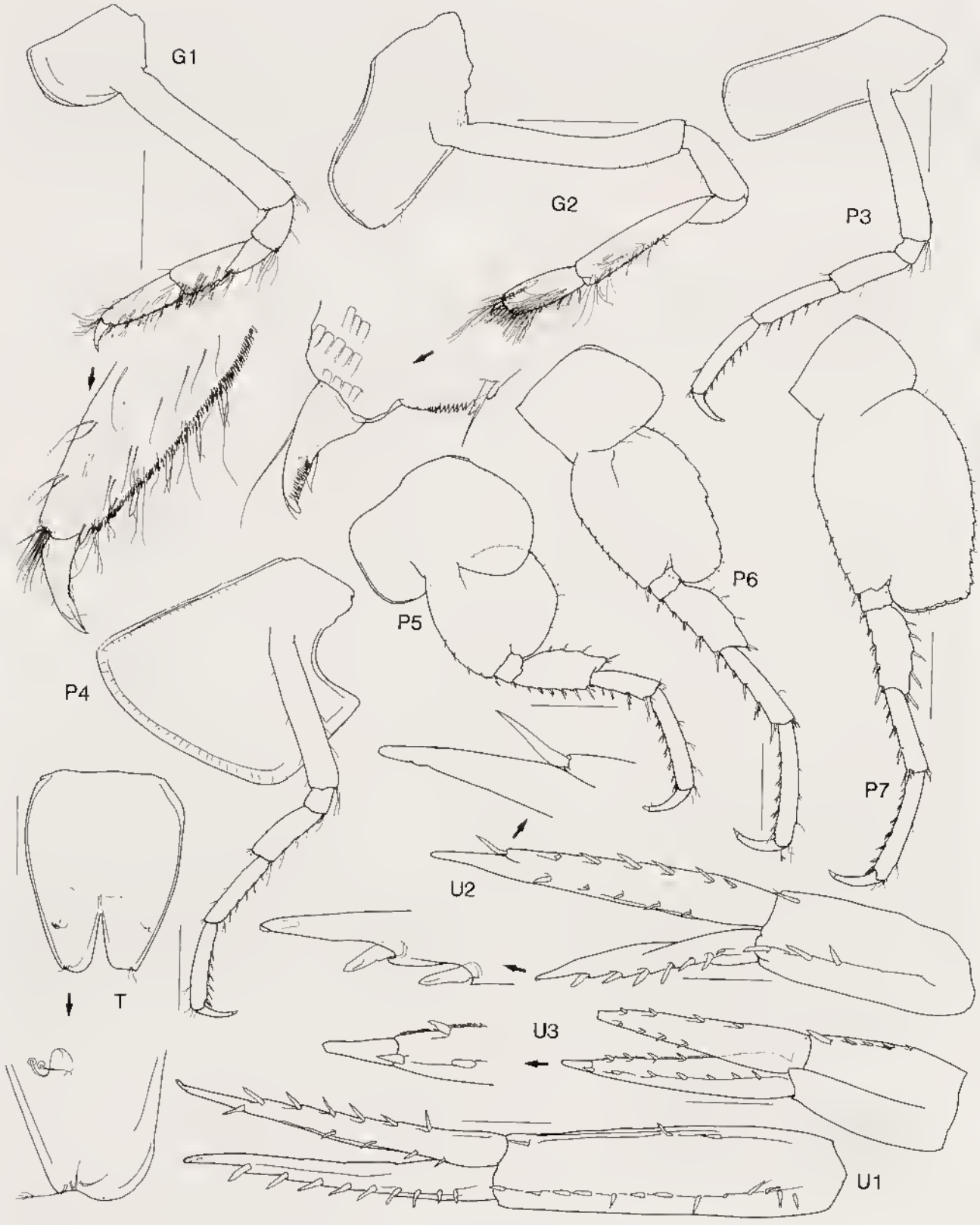

FIG. 9. — *Bathyamaryllis ouvea* sp. nov., holotype female, 7.8 mm (MNHN-Am 4775), south of the Isle of Pines, New Caledonia. Scales for U1-3 represent 0.2 mm, remainder represent 0.5 mm.

Source : MNHN, Paris

Peraeopod 3 : coxa large; merus not expanded anteriorly; merus-carpus without brush of simple setae in female (dense brush present in male); propodus with 6 spines and 2 distal spines along posterior margin; dactylus short, slender. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior and posterior margins obtusely angled; merus not expanded anteriorly; merus-carpus without brush of simple setae in female (dense brush present in male); propodus with 6 spines and 2 distal spines along posterior margin; dactylus short, slender. *Peraeopod 5* : coxa bilobate, posterior lobe produced ventrally; basis expanded with posterior margin smooth; merus slightly expanded posteriorly; propodus with 10 spines and 2 distal spines along anterior margin; dactylus short, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis, anterior margin rounded proximally, straight distally, basis expanded posteriorly with minutely crenate posterior margin, without anteroventral lobe; merus slightly expanded and rounded posteroproximally, straight posterodistally with 5 setae; propodus with 10 spines and 2 distal spines along anterior margin; dactylus short, slender. *Peraeopod 7* : basis expanded posteriorly, posterior margin almost straight, minutely crenate, posteroventral corner subquadrate, posteroventral margin straight; merus slightly expanded, convex posterior margin with 6 spines; propodus with 11 spines and 2 distal spines along anterior margin and 5 setae along posterior margin; dactylus short, slender.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* : from gnathopod 2 to peraeopod 7, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner rounded. *Epimeron 3* : posteroventral corner notched. *Urosomites* : dorsally smooth. *Uropod 1* : peduncle with 12 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial spines; rami subequal in length, outer ramus with 9 lateral spines; inner ramus with 5 medial and 6 lateral spines. *Uropod 2* : peduncle with 2 dorsolateral, 1 apicolateral and 1 apicomedial spines; outer ramus 0.68 times as long as inner ramus, outer ramus with 7 lateral spines, inner ramus with 5 medial and 6,1 lateral spines; inner ramus with weak constriction. *Uropod 3* : peduncle well developed, short, length 1.6 times breadth, without dorsolateral flange, with 5 dorsomedial and 1 apicomedial spines, without midlateral spines or setae, without distoventral spines; rami lanceolate, subequal in length, outer ramus 2-articulate, article 2 short, article 1 with 7 lateral and 4 medial spines; inner ramus with 4 medial and 4 lateral spines, plumose setae absent in female (present in male). *Telson* : slightly longer than broad, length 1.1 times breadth, slightly to moderately cleft (29%), distal margins rounded, with 1 marginal penicillate seta and 1-2 simple setae on each lobe, without marginal spines.

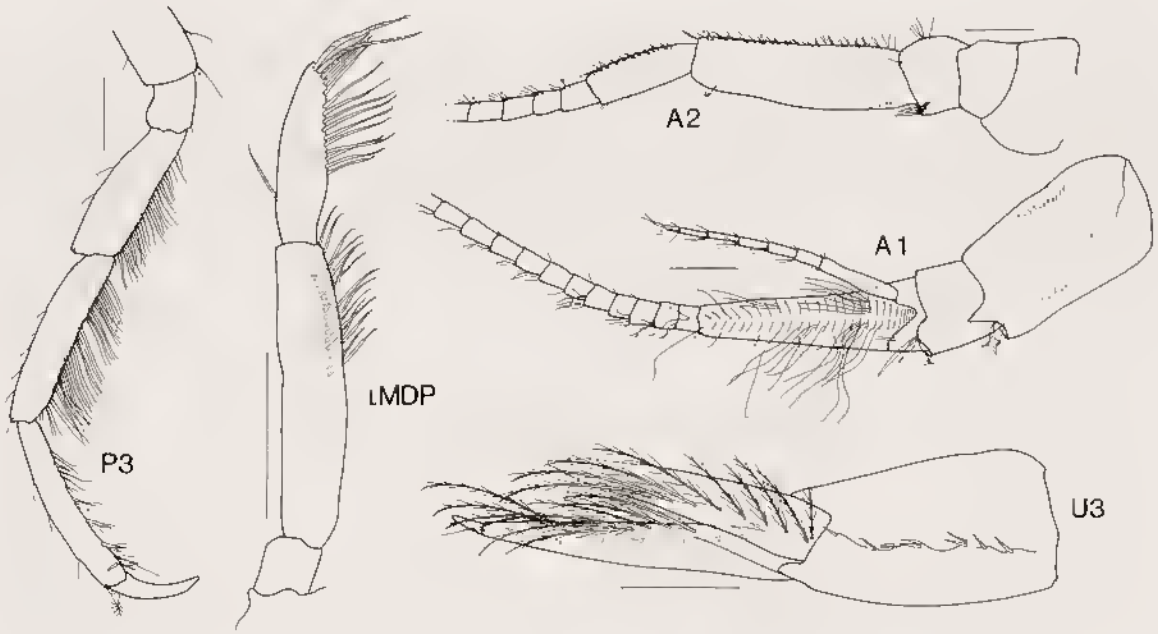

FIG. 10. — *Bathyamaryllis ouvea* sp. nov., paratype male, 8.0 mm (MNHN-Am 4793), north-west of the Isle of Pines, New Caledonia. Scales represent 0.2 mm.

Source : MNHN, Paris

ETYMOLOGY. — Named for the island of Ouvéa in the Loyalty Islands.

REMARKS. — Immature males in these samples differ from adults in several ways : although the proximal articles of the antenna 1 flagellum have fused, aesthetases have not developed; there are no setal brushes on the merus-carpus of peraeopods 3 and 4; and plumose setae have not developed on the rami of uropod 3.

Bathyamaryllis ouvea and *B. perezii* Pirlot, 1933, are very closely related. The most obvious difference between them is that *B. perezii* has much more slender first and second antennae in which peduncular article 2 of antenna 1 is 0.9 times as long as article 1 and peduncular articles 4 and 5 of antenna 2 are each 6 times as long as wide and the apparent lack of spines on the medial margin of the inner ramus of uropod 2. More subtle differences in *B. perezii* include the maxillipedal palp which is more slender, the palm of gnathopod 2 which is transverse and the posteroventral corner of the basis of peraeopod 7 which is more rounded.

DISTRIBUTION. — *Bathyamaryllis ouvea* is known from south of the Isle of Pines and the strait between New Caledonia and the Loyalty Islands, in 375 to 610 m depth.

Genus *CLEPIDECRELLA* J.L. Barnard, 1962

Clepidecrella J.L. Barnard, 1962 : 24; 1969 : 338. — BARNARD & KARAMAN, 1991 : 476.

DIAGNOSIS. — Mandible : incisor and lacinia mobilis present, accessory spine row absent, molar vestigial. Maxilla 1 : inner plate reduced, without apical setae; outer plate with reduced number of spine-teeth. Maxilliped : inner and outer plates reduced in size and spination. Gnathopod 1 : linear, simple or weakly subchelate. Peraeopod 4 : coxa with very large posteroventral lobe. Peraeopod 5 : basis slightly to moderately expanded. Uropod 3 : inner ramus reduced or absent.

TYPE SPECIES. — *Clepidecrella cabinda* J.L. Barnard, 1962, by original designation.

SPECIES COMPOSITION. — *Clepidecrella* contains two species : *C. cabinda* J.L. Barnard, 1962, and *C. tropicalis* sp. nov.

REMARKS. — *Clepidecrella* has most of the characters of *Kerguelenia*, particularly the reduced spine-tooth arrangement of maxilla 1; reduced inner and outer plates on the maxilliped; simple, linear gnathopod 1; very large posteroventral lobe on coxa 4; linear to moderately expanded basis on peraeopod 5; and the reduced rami of uropod 3. It differs in the mandible which has a vestigial incisor and a vestigial molar. Keeping them separate, based on the mandible, indicates that gnathopod 1 and uropod 3 are homoplastic characters. Although this is not a satisfactory arrangement we are leaving the genera separate until a more complete phylogenetic assessment is available.

DISTRIBUTION. — *Clepidecrella* is known from the tropical western South Pacific Ocean and the South Atlantic Ocean, in 450 to 5000 m depth.

Clepidecrella tropicalis sp. nov.

Figs 11-13

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn DW 44, 22°47.30'S, 167°14.30'E to 22°47.35'S, 167°14.50'E, south of the Isle of Pines, 440-450 m, 30 August 1985 : 1 ♀, 5.0 mm, ovigerous, 2 eggs (MNHN-Am 4385).

TYPES. — The unique specimen is the holotype.

Source : MNHN, Paris

TYPE LOCALITY. — South of the Isle of Pines, New Caledonia, 22°47.30'S, 167°14.30'E to 22°47.35'S, 167°14.50'E, 440 to 450 m.

DIAGNOSIS. — Antenna 1 : flagellum 13-articulate. Antenna 2 : flagellum 9-articulate. Mandible : palp article 2 with 6 distal A2-setae. Gnathopod 1 : simple with linear carpus and propodus. Peraeopod 5 : basis moderately expanded with small posteroventral lobe. Epimeron 3 : posteroventral corner narrowly rounded. Uropod 3 : rami absent. Telson : entire, posterior margin emarginate.

FIG. 11. — *Clepidecrella tropicalis* sp. nov., holotype female, 5.0 mm (MNHN-Am 4385), south of the Isle of Pines, New Caledonia.

DESCRIPTION. — Holotype female, 5.0 mm; male not known. *Head* : exposed, slightly longer than deep; lateral cephalic lobe large, narrow, subacute; rostrum small; eyes oval. *Antenna 1* : medium length, 0.2 times body; peduncular article 1 short, length 1.3 times breadth, with dorsal crest, without tooth on distomedial margin, without anterodistal projection; peduncular article 2 short, 0.13 times article 1, without anterodistal projection; peduncular article 3 short, 0.13 times article 1; accessory flagellum short, 0.33 times primary flagellum, 3-articulate, article 1 long, 1 times article 2; flagellum 13-articulate, without callynophore. *Antenna 2* : subequal in length to antenna 1; peduncle without brush setae, female weakly geniculate between peduncular articles 3-4, article 3 long, 0.75 times article 4; flagellum well developed, 9-articulate, without thick setal brush.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : unknown. *Mandible* : incisors vestigial; left lacinia mobilis present, a small spine; molar vestigial; mandibular palp attached distally; article 1 short, length 1.3 times breadth; article 2 slender, length 6.8 times breadth, 2.3 times article 3, with 6 distal A2-setae, without D2-setae; article 3 slender, distally truncate, long, length 4 times breadth, without proximal A3-setae or D3-setae, with 2 apical E3-setae. *Maxilla 1* : inner plate narrow, without apical setae; outer plate small, narrow, with 6 spine-teeth in modified 7/4 arrangement; outer row with ST1 to ST3 small, stout, weakly cuspidate, ST4 small, stout, 3-cuspidate, ST5 absent, ST6 small, stout, 2-cuspidate, ST7 small, broad, 3- to 4-cuspidate distally; inner row with STA-STD absent; palp large, 2-articulate, with 3 short terminal spines, without subterminal setae, flag spine present on distolateral corner, distomedial margin smooth. *Maxilla 2* : inner plate narrow, outer plate broader. *Maxilliped* : inner plate small, subrectangular, with 2 apical nodular spines, oblique setal row absent; outer plate vestigial, subovate, without apical setae, apical spines or apical teeth, with 2 large distomedial spines, submarginal setae long, simple; palp large, 4-articulate; article 2 broad, length 1.6 times breadth, 0.81 times

Source : MNHN, Paris

article 3; article 3 long, slender, length 2.5 times breadth; dactylus well developed, with 1 terminal and 1 subterminal setae, unguis absent.

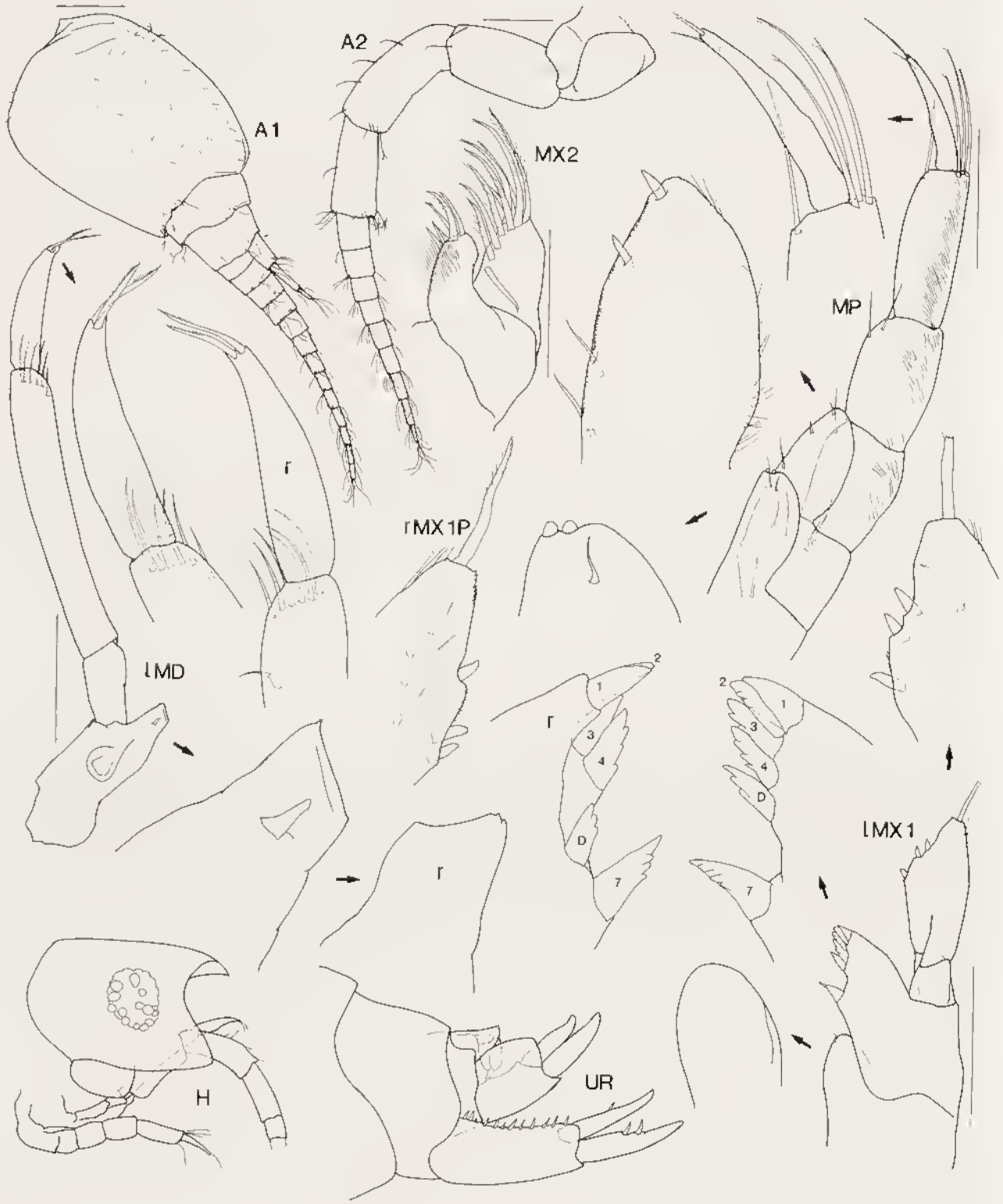

FIG. 12. — *Clepidecrella tropicalis* sp. nov., holotype female, 5.0 mm (MNHN-Am 4385), south of the Isle of Pines, New Caledonia. Scales represent 0.1 mm.

Source : MNHN, Paris

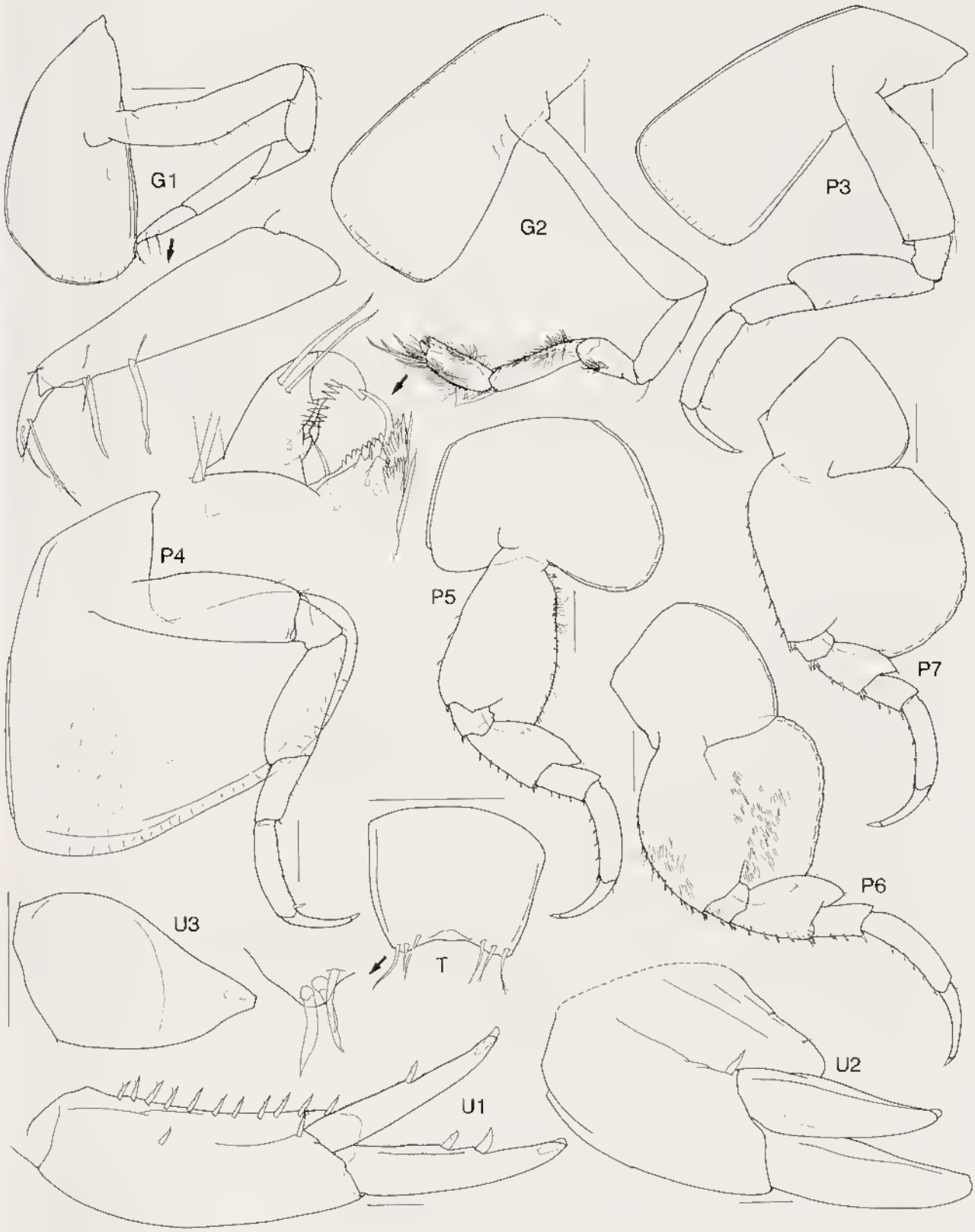

FIG. 13. — *Clepidecrella tropicalis* sp. nov., holotype female, 5.0 mm (MNHN-Am 4385), south of the Isle of Pines, New Caledonia. Scales for U1-3, T represent 0.05 mm, remainder represent 0.2 mm.

Source : MNHN, Paris

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : simple; coxa large, as long as coxa 2, anterior margin slightly convex, anteroventral corner rounded, posterior margin straight; basis long, slender, length 4.5 times breadth, anterior margin smooth, with simple setae; ischium long, length 2.9 times breadth; merus, posterior margin without setae; carpus subrectangular, very long, length 4.6 times breadth, longer than (1.9 times) propodus, without denticulate patch near posterodistal margin; propodus large, subtriangular, length 3.1 times breadth, tapering distally, posterior margin smooth, straight, with setae, without disto-medial setae, without denticulate patch near posterior margin, palm absent; dactylus simple, with large plumose seta. *Gnathopod 2* : minutely chelate; coxa large, subequal in size to coxa 3; ischium long, length 3.6 times breadth; carpus long, length 3.5 times breadth, posterior margin straight; propodus subrectangular, long, length 2.4 times breadth, palm obtuse, with straight, serrate margin, posterodistal corner without spines; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3 : coxa large; merus weakly expanded anteriorly; propodus with 5 setae and 1 distal locking spine along posterior margin; dactylus long, slender. *Peraeopod 4* : coxa deeper than wide, with very large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus weakly expanded anteriorly; propodus with 5 setae and 1 distal spine along posterior margin; dactylus long, slender. *Peraeopod 5* : coxa bilobate, posterior lobe slightly produced ventrally; basis moderately expanded posteriorly with posteroventral lobe about as long as merus; merus expanded with rounded posterior margin; propodus with 4 spines and 2 distal locking spines along anterior margin; dactylus long, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis, anterior margin rounded, basis expanded posteriorly with minutely crenate posterior margin, without anteroventral lobe; merus expanded with rounded posteroproximal shoulder and straight posterior margin; propodus with 4 spines and 2 distal locking spines along anterior margin; dactylus long, slender. *Peraeopod 7* : basis expanded posteriorly, posterior margin broadly rounded, posteroventral margin rounded; merus expanded, convex posterior margin with 3 spines; propodus with 3 spines and 2 distal locking spines along anterior margin and no spines along posterior margin; dactylus long, slender.

Oostegites : on peracopod 5 only. *Gills* : from gnathopod 2 to peracopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 3* : posteroventral corner narrowly rounded. *Urosomites* : dorsally smooth. *Uropod 1* : peduncle with 10 dorsolateral, 1 apicolateral, 1 dorsomedial and 1 apicomedial spines; rami subequal in length, outer ramus with 2 dorsal spines; inner ramus with 1 dorsal spine. *Uropod 2* : peduncle with large dorsolateral flange, with 1 apicomedial spine, without spines along distal margin; outer ramus slightly longer than inner ramus, rami without spines; inner ramus without constriction. *Uropod 3* : peduncle well developed, short, without dorsolateral flange, without dorsal spines, with 1 distal simple seta, without distoventral spines; rami absent. *Telson* : shorter than broad, length 0.75 times breadth, entire, emarginate, without dorsal setae, marginal penicillate setae or marginal spines, with 6 simple marginal setae.

ETYMOLOGY. — The name reflects the first species of *Clepidecrella* reported from a tropical area.

REMARKS. — *Clepidecrella tropicalis* and *C. cabinda* J.L. Barnard, 1962, the only other species in the genus, differ in the following ways : *C. cabinda* has no eyes; the flagellum of antenna 1 has only 5 articles, and of antenna 2, only 4; mandibular palp article 2 has only 1 distal A2-seta; gnathopod 1 is weakly subchelate and the carpus is not long and linear; the posteroventral corner of epimeron 3 is subquadrate; the peduncle of uropod 1 is less spinose; uropod 3 is biramous; and the telson is cleft.

DISTRIBUTION. — South of the Isle of Pines, New Caledonia, in 400 to 450 m depth.

Genus *CORIOLISA* gen. nov.

DIAGNOSIS. — Antenna 1 with callynophore in male and female. Mandible : incisor distally placed; lacinia mobilis present; lamina dentata weakly developed; accessory spine row on a raised, setose ridge, spines nodular; molar, if present, a small setose flap. Maxilla 1 : outer plate with small apical spine-teeth; palp vestigial.

Source : MNHN, Paris

Maxilliped with 3- or 4-articulate palp, articles 1 and 2 may be partially fused. Gnathopod 1 : palm may be defined by complex spine.

TYPE SPECIES. — *Coriolisa novacaledonia* sp. nov.

SPECIES COMPOSITION. — *Coriolisa* contains two species : *C. novacaledonia* and *C. sculptidentata* (Ren in REN & HUANG, 1991).

ETYMOLOGY. — Named for the R.V. *Coriolis*, the ship from which many of the tropical western South Pacific species have been collected.

REMARKS. — LOWRY (1984) remarked on the similarity between *Prachynella* and *Drummondia*. *Drummondia* differs in having a dorsally placed incisor, a well developed lamina dentata on the mandible and a 4-articulate maxillipedal palp. The new species, *Coriolisa novacaledonia*, described below, obscures these differences. It has a weakly developed lamina dentata (*Prachynella*), the spine-teeth on the outer plate of maxilla 1 are located apically (*Prachynella*), it has a vestigial 1-articulate palp on maxilla 1 (*Prachynella*) and it has a maxillipedal palp in which articles 1 and 2 are partially fused leaving a 3-articulate maxillipedal palp (*Drummondia*). Finally, the spines of the accessory spine row are modified into nodules sitting on a raised setose ridge, a character shared by *Coriolisa novacaledonia* sp. nov. and *C. sculptidentata* (Ren in REN & HUANG, 1991). In fact these two species appear to be closely related, but *C. sculptidentata* has a molar, a unique character among the pachynid group. We have seen evidence of a vestigial lamina dentata in other species of *Prachynella*.

DISTRIBUTION. — *Coriolisa* is known from the tropical western South Pacific Ocean and the western Southern Ocean, in 400 to 1600 m depth.

Coriolisa novacaledonia sp. nov.

Figs 14-15

MATERIAL EXAMINED. — **Loyalty Islands**. BIOGEOCAL : stn CP 317, 20°48.12'S, 166°53.16'E, west of Lifou, 1620-1630 m, 1 May 1987 : 1 ♂, 6.4 mm (MNHN-Am 4400).

TYPES. — The unique specimen is the holotype.

TYPE LOCALITY. — West of Lifou, Loyalty Islands, 20°48.12'S, 166°14.53.16'E, 1620 to 1630 m.

DIAGNOSIS. — Mandible : accessory spine row, left with 3, right with 4 short nodular spines on a raised setose ridge. Maxilla 1 : 4 short, stout, sculptured spine-teeth on inner row of outer plate. Gnathopod 1 : palm obtuse with straight, serrate margin. Peraeopod 5 : posterior margin of basis with 2 large teeth. Uropod 3 : inner ramus reduced, 0.7 times outer ramus.

DESCRIPTION. — Based on holotype male, 6.4 mm; female not known. *Head* : exposed, slightly longer than deep, ventrally truncated with straight ventral margin; lateral cephalic lobe large, broadly rounded; rostrum absent; eyes apparently absent. *Antenna 1* : short, 0.1 times body; peduncular article 1 short (really massive), length 1.2 times breadth, with small midmedial tooth, with large posterodistal tooth, without anterodistal projection; peduncular article 2 short, 0.1 times article 1, without anterodistal projection; accessory flagellum short, 0.3 times primary flagellum, 2-articulate, article 1 short, 1 times article 2; flagellum 5-articulate, with strong 1-field callynophore without spines or setae. *Antenna 2* : subequal in length to antenna 1; strongly geniculate between peduncular articles 3-4, article 3 long, 1.4 times article 4; flagellum well developed, 5-articulate, with thick setal brush on articles 1 to 3.

Mouthpart bundle : quadrate, projecting anteriorly. *Epistome* and *upper lip* : fused, straight. *Mandible* : incisors symmetrical, small, with slightly convex margins; left lacinia mobilis present, a short smooth peg; accessory spine row, left with 3, right with 4 nodular spines on raised setose ridge, left lamina dentata present; molar absent;

Source : MNHN, Paris

mandibular palp attached midway; article 1 short, length 1.6 times breadth; article 2 broad, length 2.4 times breadth, 0.9 times article 3, without A2-setae, with 4 D2-setae; article 3 spatulate, long, length 3.2 times breadth, without A3-setae, with 4 distal D3-setae and 2 apical E3-setae. *Maxilla 1* : inner plate narrow, with 2 plumose and 3 simple apical setae; outer plate with 10 spine-teeth in modified 7/4 arrangement; outer row with ST1 to ST3 large, stout, weakly cuspidate, ST4-ST5 large, stout, 5-cuspidate, ST6 large, stout, 5- to 6-cuspidate, ST7 absent; inner row with STA small, displaced from STB-STD, 4- to 5-cuspidate, STB small, slender, 3- to 4-cuspidate, STC small, slender, 2-cuspidate, medial cusp long and 3-cuspidate, STD small, slender, 2- to 3-cuspidate; palp vestigial, 1-articulate. *Maxilla 2* : inner and outer plates narrow, inner plate 0.76 times length outer plate. *Maxilliped* : inner plate small, subovate, without nodular spines, oblique setal row absent; outer plate large, subovate, without subapical notch, without apical setae, medial spines vestigial, submarginal setae short, simple; palp large, 3-articulate, articles 1 and 2 fused; article 2 broad, length 2.85 times breadth, 2.5 times article 3; article 3 short, slender, length 2 times breadth; dactylus reduced, with 1 subterminal seta, unguis present.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : chelate; coxa large, as long as coxa 2, anterior margin straight, posterior margin straight; basis long, slender, length 2.7 times breadth, anterior margin smooth, with simple setae; ischium short, length 1.3 times breadth; merus, posterior margin with 1 seta, carpus extremely compressed, hidden by propodus; propodus massive, subrectangular, length 1.4 times breadth, margins subparallel, posterior margin smooth, subtly sinusoidal, without spines or setae, palm obtuse, margin straight, serrate, posterodistal corner with complex spine; dactylus simple, without subterminal teeth or spines. *Gnathopod 2* : minutely chelate; coxa large, subequal in size to coxa 3; ischium long, length 3.3 times breadth; carpus long, length 3.8 times breadth, posterior margin straight; propodus subrectangular, short, length 1.8 times breadth, palm slightly obtuse, with straight, serrate margin, posterodistal corner without spines; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3 : coxa large; merus weakly expanded anteriorly; propodus with 2 small setae and 1 distal spine along posterior margin; dactylus long, slender. *Peraeopod 4* : coxa as deep as wide, with large posteroventral lobe, anterior margin rounded, posterior margin sloping anteriorly; merus weakly expanded anteriorly; propodus with 2 small setae and 1 distal spine along posterior margin; dactylus long, slender. *Peraeopod 5* : coxa equilobate; basis expanded, posterodorsal margin arched, forming large posteroproximal tooth, posterior margin with two prominent teeth; merus expanded with rounded posterior margin; propodus with 3 small spines and 2 distal spines along anterior margin; dactylus short, stocky. *Peraeopod 6* : coxa small, slightly lobate posteriorly; basis, expanded, posterodorsal margin rounded, gently sloping into prominent tooth, posterior margin straight, with one weak tooth; merus expanded with rounded posterior margin; propodus with 3 spines and 2 small distal spines along anterior margin; dactylus short, stocky. *Peraeopod 7* : basis expanded posteriorly, posterior margin rounded with three posterodistal teeth, posteroventral corner subquadrate, posteroventral margin rounded; merus expanded, convex posterior margin with 3 spines; propodus with 3 spines and 1 distal spine along anterior margin and 1 distal spine along posterior margin; dactylus short, stocky.

Gills : from gnathopod 2 to peraeopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 3* : posteroventral corner broadly rounded. *Urosomites* : dorsally smooth. *Uropod 1* : peduncle with 1 dorsolateral, 1 apicolateral and 1 apicomedial spines; outer ramus slightly longer than inner ramus, outer ramus with 1 lateral spine; inner ramus without spines. *Uropod 2* : peduncle without dorsolateral flange, with 1 apicolateral and 1 apicomedial spines; rami subequal in length, without spines; inner ramus without constriction or proximal flange. *Uropod 3* : peduncle short, length 1.2 times breadth, without dorsolateral flange, without dorsal spines; rami lanceolate, inner ramus reduced, about 0.7 times outer ramus, outer ramus 2-articulate, article 2 short, outer ramus with 1 medial spine. *Telson* : shorter than broad, length 0.8 times breadth, entire, emarginate, with 8 marginal penicillate setae, without simple marginal setae, without marginal spines.

ETYMOLOGY. — The specific name refers to the general area where the species has been found.

REMARKS. — *Coriolisa novacaledonia* is easily distinguished from *C. sculptidentata* by the lack of a mandibular molar, cusps on the maxilla 1 inner row spine-teeth, the shape of the propodus and palm of gnathopod 1, the lack of a dorsal tooth on peraeonite 5, the shape of the basis of peraeopod 5 and a small notch in the telson.

Source : MNHN, Paris

DISTRIBUTION.— *Coriolisa novacaledonia* is currently known only from the Loyalty Basin, in about 1600 m depth.

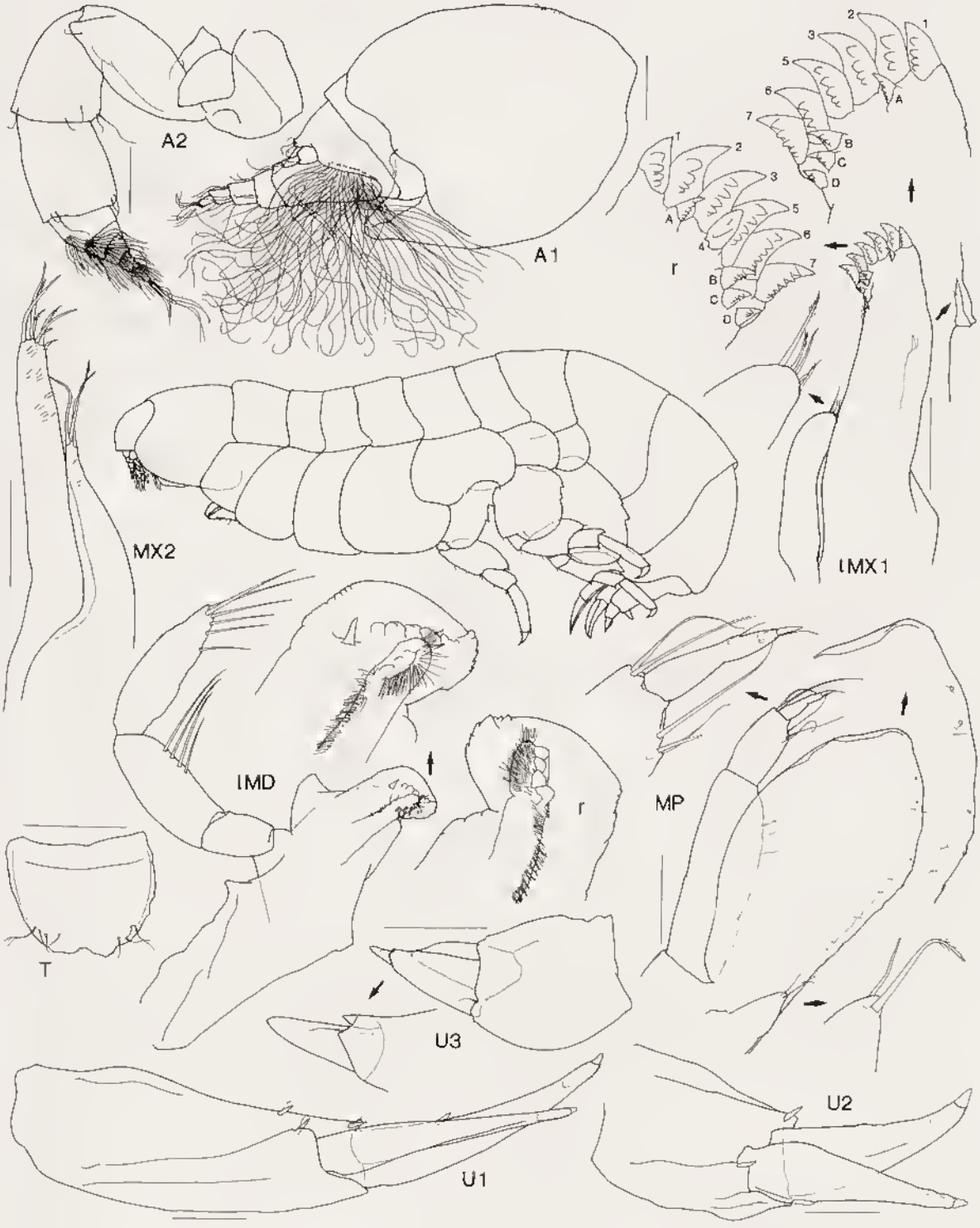

FIG. 14. — *Coriolisa novacaledonia* gen. nov., sp. nov., holotype male, 6.4 mm (MNHN-Am 4400), west of Lifou, Loyalty Islands. Scales represent 0.1 mm.

Source : MNHN, Paris

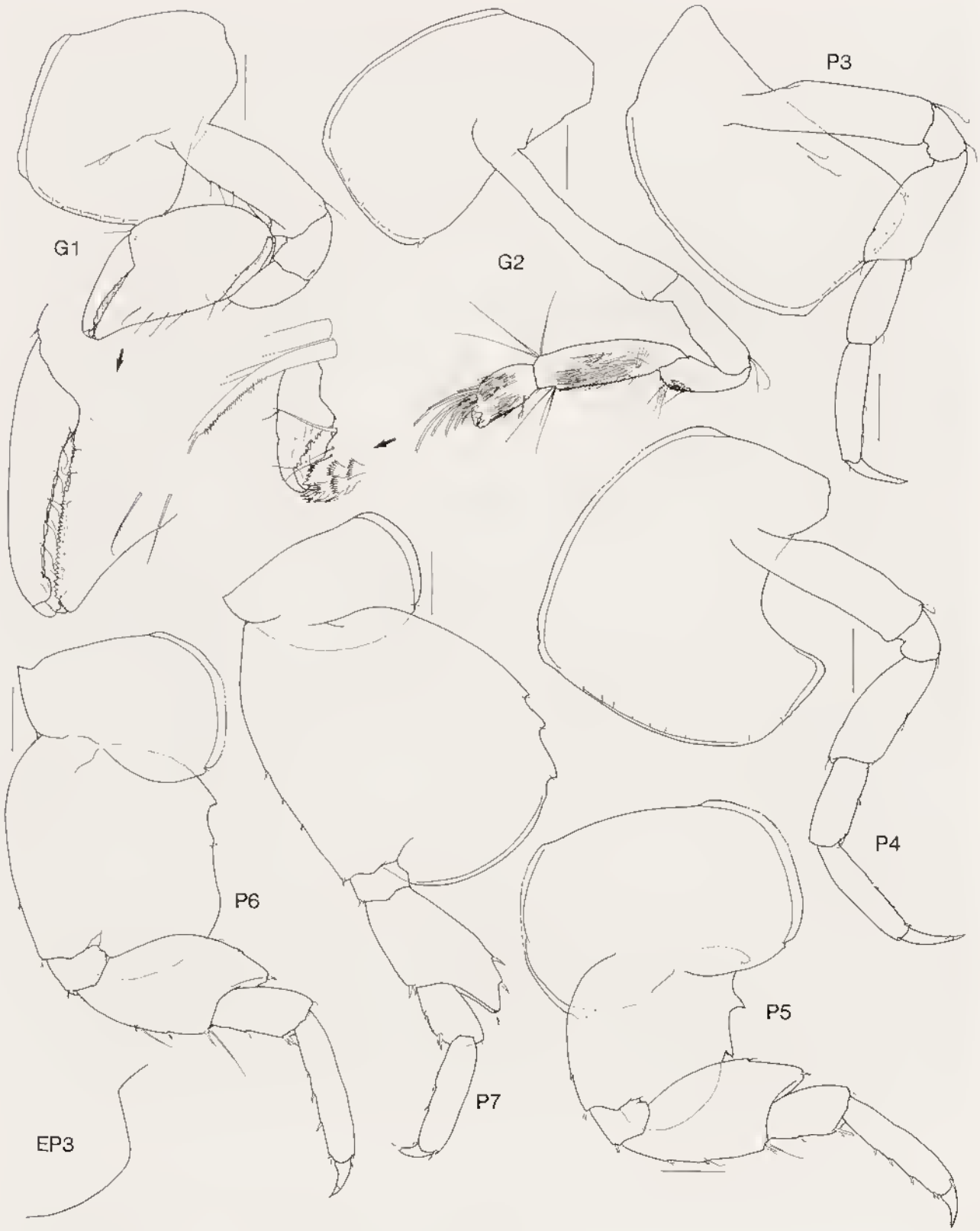

FIG. 15. — *Coriolisa novacaledonia* gen. nov., sp. nov., holotype male, 6.4 mm (MNHN-Am 4400), west of Lifou, Loyalty Islands. Scales represent 0.2 mm.

Source : MNHN, Paris

Genus *CYCLOCARIS* Stebbing, 1888

Cyclocaris tahitensis Stebbing, 1888

Cyclocaris tahitensis Stebbing, 1888 : 664, pl. 8; 1906 : 30, fig. 7. . — Della Valle, 1893 : 843, pl. 60, fig. 53. — J.L. Barnard, 1958 : 91. — Gurjanova, 1962 : 85, fig. 17. — Thurston & Allen, 1969 : 358. — Wilson *et al.*, 1985 : 1248, 1251. — Barnard & Karaman, 1991 : 479. — Vinogradov & Vinogradov, 1991 : 33. — Vinogradov, 1993 : 43.
not *Cyclocaris tahitensis* - Chevreux, 1903 : 89; 1935 : 31, pl. 4, fig. 4 (= *Cyclocaris* sp.).

Material examined. — **Austral Isles**. SMCB, R.V. *Marara* (J. Poupin & J.K. Lowry coll.) : stn FRP-6, 21°47.9'S, 154°34.8'W, north-east of Maria Island, baited trap, 680 m, 8-9 August 1991 : 4 specimens (AM P42125). — Stn FRP-7, 21°47.7'S, 154°43.4'W, north-east of Maria Island, baited trap, 500 m, 8-9 August 1991 : 8 specimens (AM P42126). — Stn FRP-21, 22°29.3'S, 151°21.6'W, off Rurulu, baited trap, 840 m, 10-11 August 1991 : 120 specimens (AM P42127). — Stn FRP-23, 22°29.3'S, 151°21.6'W, off Rurutu, baited trap on sandy bottom, 490 m, 10-11 August 1991 : 13 specimens (AM P42128). — Stn FRP-24, 22°29.3'S, 151°21.9'W, off Rurutu, baited trap on sandy boltom, 490 m, 10-11 August 1991 : 1 specimen (AM P42129). — Stn FRP-38, 23°18.6'S, 149°29.7'W, off Tubuai, baited trap, 840 m, 12-13 August 1991 : about 300 specimens (MNHN-Am 4777), about 1000 specimens (AM P42130). — Stn FRP-40, 23°19.2'S, 149°28.9'W, off Tubuai, baited trap, 65 m, 12-13 August 1991 : 1 specimen (AM P42131). — Stn FRP-54, 27°35.3'S, 144°15.5'W, off Rapa, baited trap, 870 m, 17-18 August 1991 : 1 specimen (AM P42132). — Stn FRP-55, 27°35.3'S, 144°15.5'W, off Rapa, baited trap, 870 m, 17-18 August 1991 : 505 specimens (AM P42133). — Stn FRP-64, 27°35.5'S, 144°15.8'W, off Rapa, large baited trap, 750 m, 18-19 August 1991 : 1 specimen (AM P42134). — Stn FRP-65, 27°35.5'S, 144°15.8'W, off Rapa, baited trap, 750 m, 18-19 August 1991 : 1 specimens (AM P42135). — Stn FRP-66, 27°35.5'S, 144°15.8'W, off Rapa, baited trap, 750 m, 18-19 August 1991 : 8 specimens (AM P42136).

Remarks. — The recent use of small-mesh baited traps (Vinogradov & Vinogradov, 1991; Vinogradov, 1993, and this paper) has shown that *Cyclocaris tahitensis* is a widespread, abundant scavenger in the South Pacific Ocean.

Distribution. — Hamilton and Hess guyots, central North Pacific ocean (1740 to 1790 m); Tahiti (750 m); Austral Isles (490 to 870 m); Nasca Ridge (560 m); East Pacific vent region west of Sala y Gómez, south-eastern South Pacific Ocean (2024 to 2038 m).

Genus *CYPHOCARIS* Boeck, 1871

Cyphocaris bellona sp. nov.

Figs 16-18

Material examined. — **New Caledonia**. Biocal : stn CP 61, 24°11.67'S, 167°31.37'E to 24°10.67'S, 167°33.65'E, south of the Isle of Pines, beam trawl, 1070 m, 2 September 1985 : 1 specimen (AM P42137). — Stn CP 69, 23°51.38'S, 167°58.68'E to 23°52.21'S, 167°57.82'E, south of the Isle of Pines, beam trawl, 1220-1225 m, 3 September 1985 : 1 ♂ (probably not fully mature), 18 mm (MNHN-Am 4434).

Loyalty Islands. Biogeocal : stn CP 272, 21°00.04'S, 166°56.94'E, south-west of Pointe Lefèvre, Lifou, beam trawl, 1615-1710 m, 20 April 1987 : 1 specimen (MNHN-Am 4431).

Chesterfield Islands. Musorstom 5 : stn DC 321, 21°20.40'S, 158°02.20'E, west of Middle Bellona, 1000 m, 14 October 1986 : 1 ♀, 20 mm (MNHN-Am 4427).

Types. — The female, 20 mm (MNHN-Am 4427), is the holotype. The other specimens are paralypes.

Type Locality. — West of Middle Bellona, Chesterfield Islands, 21°20.40'S, 158°02.20'E, in 1000 m depth.

Diagnosis. — Peraeonite 1 : produced into a long, narrow slightly down-turned process. Gnathopod 2 : palm acute with convex, serrate margin. Peraeopod 5 : posteroventral corner of basis produced into elongate,

Source : MNHN, Paris

dorsoproximally serrate spur. Uropod 2 : outer ramus shorter than (about 0.7 times) inner ramus. Telson 1.1 times as long as uropod 3, cleft 75%.

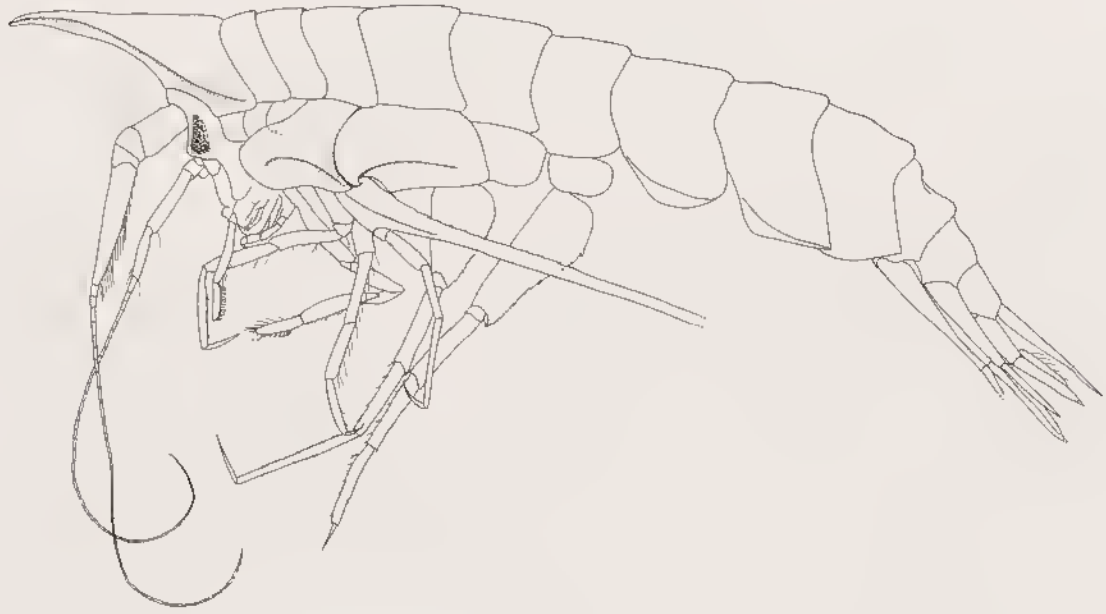

FIG. 16. — *Cyphocaris bellona* sp. nov., holotype female, 20 mm (MNHN-Am 4427), west of Bellona Reefs, Chesterfield Islands, Coral Sea.

DESCRIPTION. — Based on holotype female, 20 mm (MNHN-Am 4427); paratype male, 18 mm (MNHN-Am 4434). *Head* : positioned under produced peraeonite 1, narrow, much deeper than long, extending well below insertion of antenna 2; lateral cephalic lobe small, subacute; rostrum absent; eyes oval, not enlarged in adult male. *Antenna 1* : elongate, 0.6 times body; peduncular article 1 short, length 1.1 times breadth, without dorsal crest, tooth on distomedial margin or posterodistal tooth, with short anterodistal projection; peduncular article 2 short, 0.4 times article 1, without anterodistal projection; peduncular article 3 long, 0.43 times article 1; accessory flagellum very short, 0.16 times primary flagellum, at least 5-articulate, article 1 long, 4.3 times article 2 (male long, 6.6 times article 2), not forming cap; flagellum 33-articulate (male 34-articulate), with strong 2-field callynophore in female and male, without posterodistal setae or spines, with 1 spine each on flagellar articles 3 and 6, calceoli absent in female and male. *Antenna 2* : subequal in length to antenna 1; peduncle with weak brush setae in female and male, weakly geniculate between peduncular articles 3-4, article 3 short, 0.23 times article 4 (male weakly geniculate between peduncular articles 3-4, article 3 short, 0.39 times article 4), peduncular article 4 enlarged in male; flagellum well developed, at least 40-articulate (male at least 98), calceoli absent in female and male.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate; epistome long, straight; upper lip slightly produced, rounded. *Mandible* : incisors symmetrical, small, with slightly convex margins; left lacinia mobilis present, a stemmed distally cusped blade; accessory spine row without distal setal tuft, left and right rows each with 3 long, slender, "bushy" spines, with 2 "bottle-brush" intermediate setae; molar proximally setose, distally triturating; mandibular palp attached distally; article 1 short, length 1 times breadth; article 2 slender, length 5.1 times breadth, 1.4 times article 3, with 18 submarginal posterodistal A2-setae (male 20), without B2-setae or D2-setae; article 3 slender, blade-like, long, length 4.3 times breadth, without A3-setae or B3-setae, with 57 (male 55) D3-setae along most of posterior margin and 2 apical E3-setae. *Maxilla 1* : inner plate tapering distally, at least half of inner margin setose, with 9 plumose setae; outer plate with 11 spine-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, multicuspidate, ST4 large, stout, 3-cuspidate, ST5 large, stout, 4-cuspidate, ST6 large, stout, 5-cuspidate, ST7 contiguous with ST6, large, broad, 7-cuspidate medially; inner row with STA large, slightly displaced from STB-STD, 3-cuspidate, STB large, broad, 3-cuspidate, STC large, broad, 4-cuspidate,

Source : MNHN, Paris

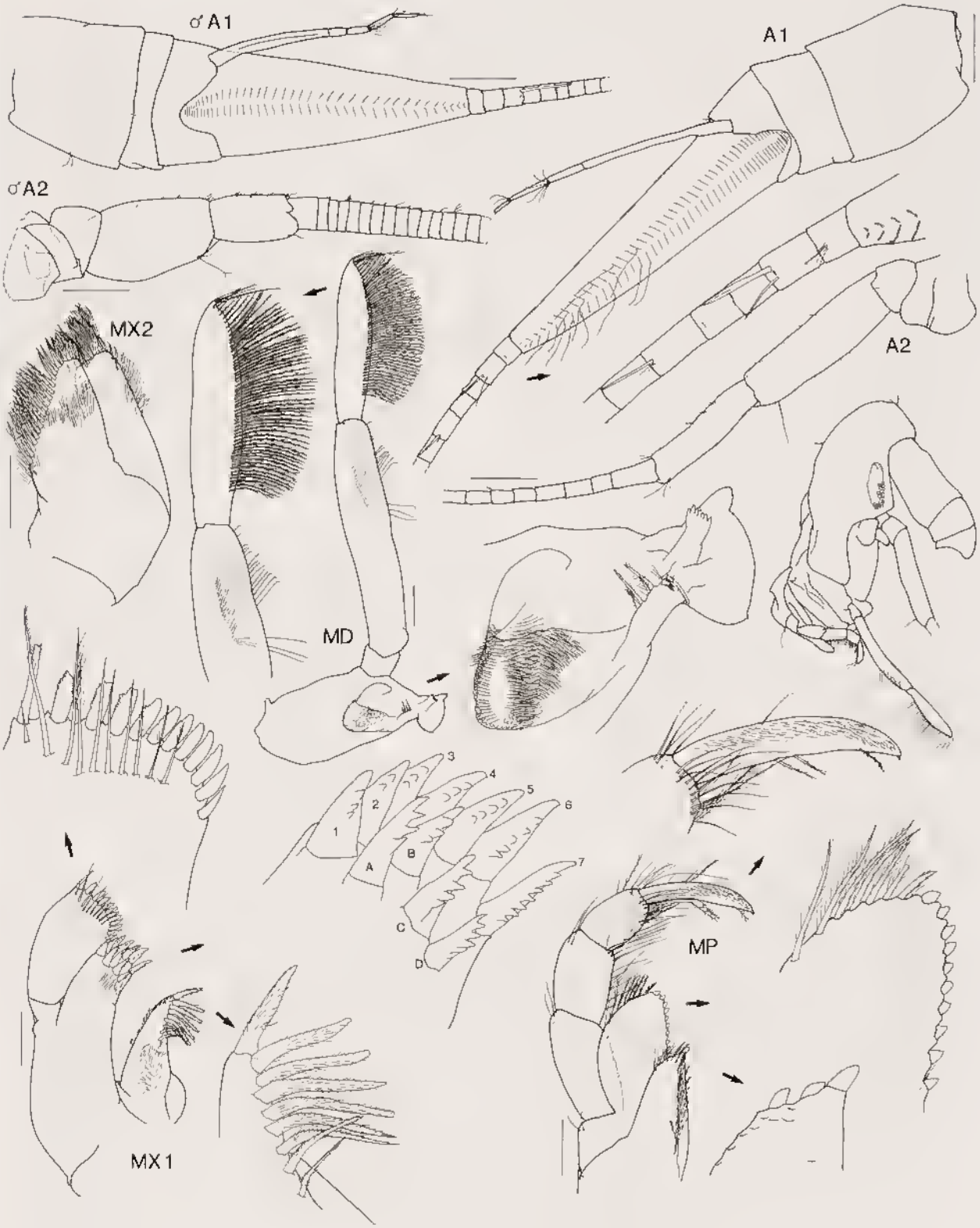

FIG. 17. — *Cyphocaris bellona* sp. nov., holotype female, 20 mm (MNHN-Am 4427); paratype male, 18 mm, MNHN-Am 4334; west of Bellona Reefs, Chesterfield Islands, Coral Sea. Scales for A1 and A2 represent 0.5 mm, remainder represent 0.2 mm.

Source : MNHN, Paris

STD large, broad, 5-cuspidate; palp large, 2-articulate, with 11 long terminal spines, with 10 subterminal setae, flag spine present on distolateral corner, distomedial margin smooth. *Maxilla 2* : inner plate broad, outer plate narrow, inner plate 1 times length outer plate. *Maxilliped* : inner plate large, subrectangular, with 3 apical nodular spines, with 1 distal spine on lateral face near inner margin, oblique setal row strong with 19 plumose setae; outer plate small, subovate, without subapical notch, with 7 apical plumose setae, without apical spines or apical teeth, medial spines present, large, submarginal setae long, simple; palp large, 4-articulate; article 2 broad, length 1.5 times breadth, 1.1 times article 3; article 3 short, broad, length 1.7 times breadth; dactylus very large, blade-like, with 4 subterminal plumose setae, unguis vestigial.

Peraeonite 1 produced anteriorly into long, narrow, slightly down-turned process. *Gnathopod 1* : simple; coxa vestigial; basis very long, slender, length 5.2 times breadth, anterior margin smooth, with simple setae; ischium short, length 0.9 times breadth, anterior margin smooth; merus, posterior margin with group of long simple setae and patch of short setae; carpus subrectangular, short, length 1.5 times breadth, shorter than (0.9 times) propodus, with patch of very fine setae near posterior margin and long simple setae along posterior margin; propodus large, subtriangular, length 2.1 times breadth, tapering distally, posterior margin serrate, straight, with 6 spines, without denticulate patch near posterior margin, palm absent; dactylus simple, with large subterminal tooth and row of 20 cuticular teeth along posterior margin. *Gnathopod 2* : minutely subchelate; coxa vestigial; ischium long, length 3.2 times breadth; carpus very long, length 4.7 times breadth, posterior margin straight; propodus subrectangular, long, length 3.2 times breadth, posterior margin without strong distal spines, palm acute, with convex, serrate margin, posterodistal corner with 1 (male 1) medial spine; dactylus reaching corner of palm, posterior margin smooth with 1 large spine.

Peraeopod 3 : coxa vestigial; merus not expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 5 spines and 2 distal spines along posterior margin; dactylus long, slender. *Peraeopod 4* : coxa deeper than wide, with acutely produced posteroventral lobe, anterior margin broadly rounded, posterior margin sinusoidal; merus not expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 3 spines and 2 distal spines along posterior margin; dactylus long, slender. *Peraeopod 5* : coxa equilobate; basis expanded posteroventrally to form elongate spur with serrate dorsoproximal margin, merus not expanded posteriorly; propodus with 9 spines and 2 distal spines along anterior margin; dactylus long, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis slightly expanded posteriorly with incised posterior margin, without anteroventral lobe; merus not expanded posteriorly; propodus with 9 spines and 2 distal spines along anterior margin; dactylus long, slender. *Peraeopod 7* : basis slightly expanded posteriorly, posterior margin sinusoidal, crenate, posteroventral corner subquadrate, posteroventral margin straight; merus not expanded posteriorly, with 6 spines; propodus with 7 spines and 1 distal spine along anterior margin and 2 spines along posterior margin; dactylus long, slender.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* : from gnathopod 2 to peraeopod 7, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner rounded. *Epimeron 3* : posteroventral corner subquadrate. *Urosomites* : urosomite 1 with anterodorsal notch, without lateral flange; urosomite 3 without small dorsolateral spine. *Uropod 1* : without fine setae; peduncle with 3 dorsolateral and 1 apicolateral spines; outer ramus, length 0.75 times inner ramus, outer ramus without spines; inner ramus with 5 lateral spines. *Uropod 2* : without fine setae; peduncle without dorsolateral flange, with 1 apicolateral spine, without plumose setae, without spines along distal margin; outer ramus 0.7 times as long as inner ramus, inner ramus with 5 lateral spines in weak acclivities; inner ramus without constriction. *Uropod 3* : peduncle well developed, long, length 2.3 times breadth, without dorsolateral flange, with 1 apicomedial spine, with 8 midlateral setae, without distoventral spines, with plumose setae in female and male; biramous, rami lanceolate, inner ramus reduced, about 0.67 times outer ramus, outer ramus 2-articulate, article 2 short, rami without spines, plumose setae present in female and male. *Telson* : longer than broad, length 3.7 times breadth, deeply cleft (75%), with 1 dorsal spine on each lobe, without dorsal setae, distal margins truncated, without marginal penicillate setae, simple setae or spines.

ETYMOLOGY. — Named for the Bellona reefs near the type locality.

Source : MNHN, Paris

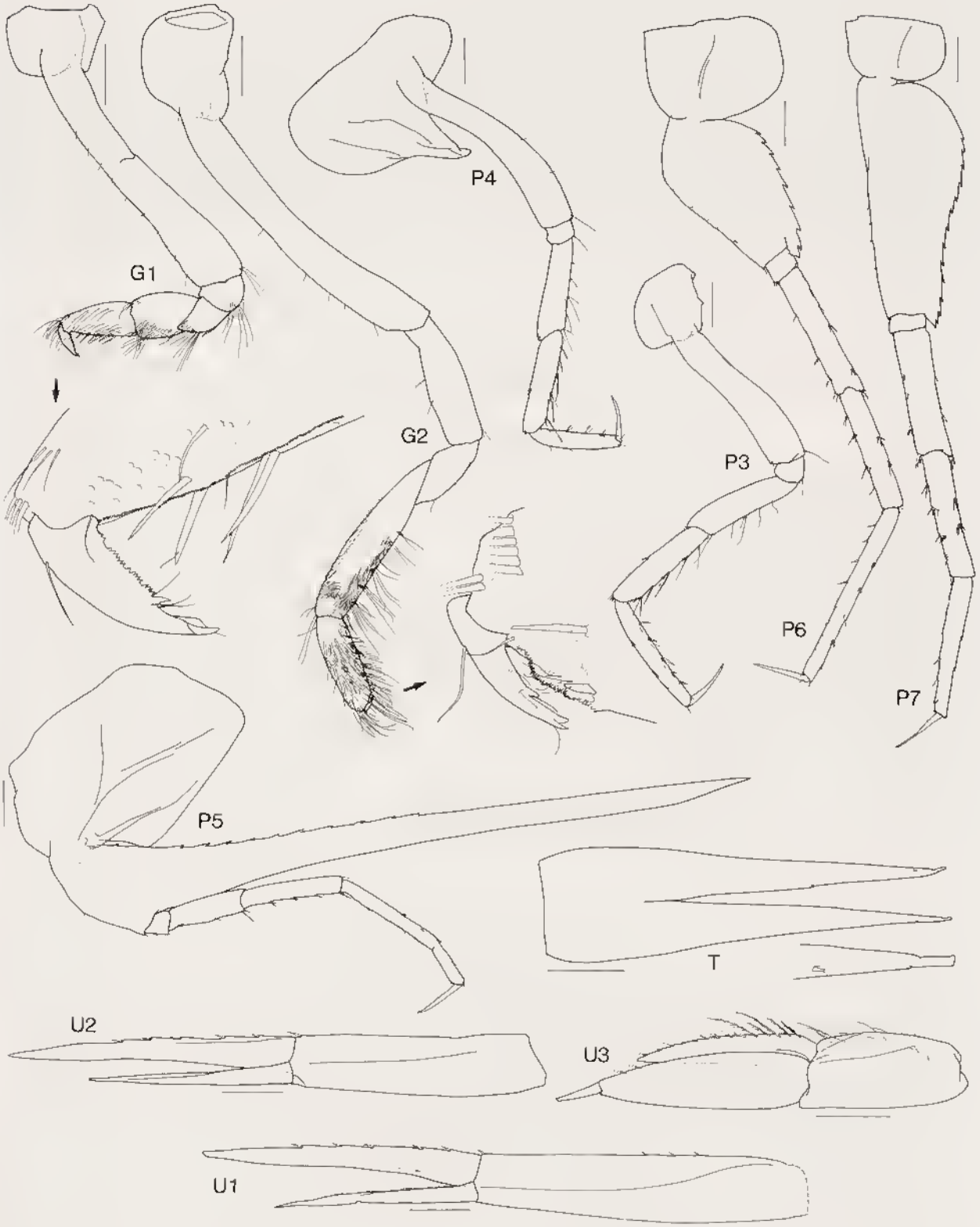

FIG. 18. — *Cyphocaris bellona* sp. nov., holotype female, 20 mm (MNHN-Am 4427), west of Bellona Reefs, Chesterfield Islands, Coral Sea. Scales represent 0.2 mm.

Source : MNHN, Paris

REMARKS. — The only species which appears to be closely related to *Cyphocaris bellona* is *C. johnsoni* described by SHOEMAKER (1934) from waters above the Puerto Rican trench, and not reported since. Both species have a posteroventral spur on the basis of peraeopod 5 in which only the dorsal margin is serrate. However, in *C. johnsoni* peraeonite 1 is distinctly curved upwards, the palm of gnathopod 2 is extremely acute and concave, uropod 3 reaches only 0.57 times the length of the telson (0.88 times in *C. bellona*) and the telson is cleft 90%. *Cyphocaris geyserensis* Ledoyer, 1986, has a strongly serrate dorsal margin on the posteroventral spur of the basis of peraeopod 5 and a weakly serrate ventral margin. It differs further from *C. bellona* in having a differently shaped peraeonite 1 projection, a convex posterior margin on the basis of peraeopod 7, subequal rami on uropod 2 and a more deeply cleft telson.

DISTRIBUTION. — Chesterfield Islands to the Loyalty Islands, in 1000 to 1700 m depth.

Genus *EURYTHENES* Smith, 1882

Eurythenes cf. *gryllus* (Lichtenstein, 1822)

MATERIAL EXAMINED. — **New Caledonia**. R.V. *Vauban* : stn CA-1, 20°44'S, 166°27'E, baited trap, 1000 m, A. INTES, 19 February 1977 : 2 ♂, 1 juvenile (AM P28855).

Loyalty Islands. BIOGEOCAL : stn CP 265, 21°04.09'S, 166°00.40'E, Loyalty Islands Basin, 1760-1870 m, 18 April 1987 : 1 immature specimen (MNHN-Am 4465). — Stn CP 317, 20°48.12'S, 166°53.16'E, west of Lifou, 1620-1630 m, 1 May 1987 : 1 ♂ (MNHN-Am 4403).

Wallis and Futuna Islands. MUSORSTOM 7 : stn CP 550, 12°14.8'S, 177°28.0'W, Combe Bank, beam trawl, 800-810 m, 18 May 1992 : 1 ♀ (MNHN-Am 4778). — Stn CP 627, 11°54.2'S, 179°31.4'W, Bayonnaise Bank, beam trawl, 597-600 m, 29 May 1992 : 2 ♂, 3 ♀, 1 immature (MNHN-Am 4779). — Stn CP 632, 11°54.0'S, 179°31.5'W, Bayonnaise Bank, beam trawl, 595-600 m, 29 May 1992 : 1 ♂ (MNHN-Am 4780).

Austral Isles. SMCB, R.V. *Marara* : stn FRP-54, 27°35.3'S, 144°15.5'W, just off Rapa, baited trap in 870 m, J.K. LOWRY & J.M. POUPIN, 17-18 August 1991 : 1 ♂ (AM P42138).

Tuamotu Archipelago. SMCB, R.V. *Marara* : 22°16'S, 138°42'W, Fangataufa atoll, baited trap, 900-1000 m, J.M. POUPIN : 2 ♂, 1 ♀ (AM P42139).

REMARKS. — Although these specimens are very similar to *Eurythenes gryllus* evidence is accumulating which suggests that the South Pacific populations are a separate species.

Genus *FIGORELLA* J.L. Barnard, 1962

Figorella tasmanica Lowry, 1984

Figorella tasmanica Lowry, 1984 : 86, figs 28-30.

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL : stn KG 201, 22°40.42'S, 166°32.72'E, south-west of Nouméa, 595 m, 7 April 1987 : 1 specimen (MNHN-Am 4424). — Stn KG 211, 22°41.80'S, 166°32.53'E, south-west of Nouméa, 975 m, 9 April 1987 : 1 specimen (MNHN-Am 4423).

Loyalty Islands. BIOGEOCAL : stn CP 317, 20°48.12'S, 166°53.16'E, west of Lifou, 1620-1630 m, 1 May 1987 : 1 specimen (MNHN-Am 4781).

REMARKS. — This is the first record of *Figorella tasmanica* since its description and significantly extends the geographic and depth ranges.

DISTRIBUTION. — *Figorella tasmanica* is known from : off the New South Wales coast, eastern Australia (615 to 1200 m); New Caledonia (595 to 1630 m).

Source : MNHN, Paris

Genus *HIPPOMEDON* Boeck, 1871

Hippomedon vao sp. nov.

Figs 19-21

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn DW 51, 23°05.27'S, 167°44.95'E, south of the Isle of Pines, 680-700 m, 31 September 1985 : 1 ♂, 10 mm (MNHN-Am 4444). — Stn CP 75, 22°18.65'S, 167°23.30'E, north of the Isle of Pines, 825-860 m, 4 September 1985 : 1 immature specimen (MNHN-Am 4378). — Stn DW 77, 22°15.32'S, 167°15.40'E, north-west of the Isle of Pines, 440 m, 5 September 1985 : 3 ♂ (MNHN-Am 4794).

TYPES. — The male (MNHN-Am 4444) is the holotype. The other specimens are paratypes.

TYPE LOCALITY. — South of the Isle of Pines, 23°05.27'S, 167°44.95'E, 680 to 700 m.

DIAGNOSIS. — Eye present. Maxilla 1 : inner plate with 2 apical, plumose setae. Gnathopod 1 : carpus long, 1.5 times propodus; palm acute with slightly convex, serrate margin. Epimeron 3 : posteroventral tooth small, broad. Telson : length 1.2 times breadth, cleft 75%.

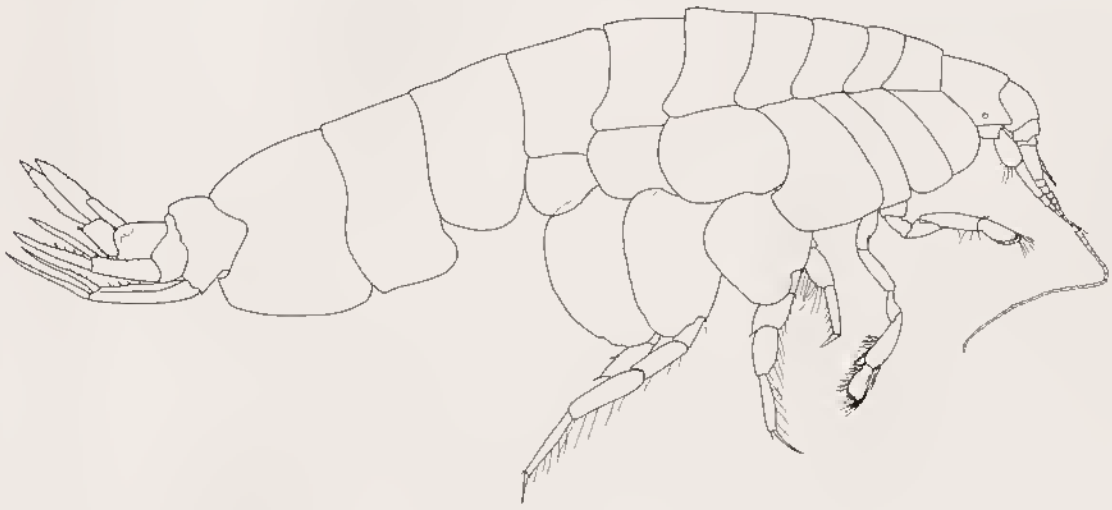

FIG. 19. — *Hippomedon vao* sp. nov., holotype male, 10 mm (MNHN-Am 4444), south of the Isle of Pines, New Caledonia.

DESCRIPTION. — Based on male holotype, 10 mm; female not known. *Head and body* : without setae. *Head* : exposed, deeper than long; lateral cephalic lobe large, narrow, subacute; rostrum absent; eyes absent in preserved material, ventral lens present. *Antenna 1* : short, 0.17 times body; peduncular article 1 short, length 1.1 times breadth, without dorsal crest, with small midmedial swelling, without posterodistal tooth or anterodistal projection; peduncular article 2 short, 0.29 times article 1, without anterodistal projection; peduncular article 3 short, 0.23 times article 1; accessory flagellum medium length, 0.42 times primary flagellum, 5-articulate, article 1 short, 1.3 times article 2; flagellum 12-articulate, with strong 2-field callynophore with 6 large posterodistal spines, without flagellar spines, calceoli present in adult male, proximal calceoli much larger than rest. *Antenna 2* : 0.7 times body length in male; peduncle with strong brush setae, weakly geniculate between peduncular articles 3-4, article 3 short, 0.55 times article 4, peduncular articles 4 and 5 not enlarged in male; flagellum well developed, 31-articulate in male, calceoli present in adult male.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate; epistome straight; upper lip slightly produced, rounded. *Mandible* : incisors symmetrical, small, with slightly convex margins; left lacinia mobilis present, a stemmed distally serrate blade; accessory spine row without distal setal tuft, left and right rows each

Source : MNHN, Paris

with 3 short, slender, "bushy" spines, without intermediate setae; molar columnar with fully triturating surface, large plumose seta absent; mandibular palp attached distally; article 1 short, length 1 times breadth; article 2 slender, length 3.5 times breadth, 1.2 times article 3, with 15 submarginal posterodistal A2-setae, without B2-setae or D2-setae; article 3 falcate, long, length 3.5 times breadth, without proximal A3-setae, without B3-setae, with 21 D3-setae along most of posterior margin and 2 apical E3-setae. *Maxilla 1* : inner plate narrow with 2 plumose apical setae, outer seta with denticulate row; outer plate with 11 spine-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, weakly cuspidate, ST4 large, stout, 2-cuspidate, ST5 large, stout, 3-cuspidate,

FIG. 20. — *Hippomedon vao* sp. nov., holotype male, 10 mm (MNHN-Am 4444), south of the Isle of Pines, New Caledonia. Scales represent 0.2 mm.

Source : MNHN, Paris

ST6 large, stout, 7-cuspidate, ST7 contiguous with ST6, large, broad, 6-cuspidate; inner row with STA large, slightly displaced from STB-STD, 3-cuspidate, STB large, broad, 3-cuspidate, STC-STD large, broad, 4-cuspidate; palp large, 2-articulate, with 9 short terminal spines, with 1 subterminal setae, flag spine present on distolateral corner, distomedial margin smooth. *Maxilla 2* : inner and outer plates broad, inner plate 1 times length outer plate. *Maxilliped* : inner plate large, subrectangular, with 3 apical nodular spines, with 2 distal spines on lateral face near inner margin, oblique setal row strong with 15 plumose setae; outer plate medium size, subovate, without subapical notch, without apical setae, with 1 apical spine, without apical teeth, medial spines present, large, submarginal setae short, simple; palp large, 4-articulate; article 2 very broad, length 2.2 times breadth, 1.1 times article 3; article 3 short, broad, length 1.4 times breadth; dactylus well developed, with 5 subterminal setae, unguis present.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : subchelate; coxa large, as long as coxa 2, anterior margin slightly convex, anteroventral corner rounded, posterior margin slightly convex; basis long, slender, length 3.7 times breadth, anterior margin smooth, with simple setae; ischium short, length 1.3 times breadth; merus, posterior margin with a few simple setae; carpus subrectangular, long, length 2.8 times breadth, longer than (1.5 times) propodus, with long simple setae along posterior margin; propodus large, subovate, length 1.8 times breadth, margins slightly converging distally, posterior margin smooth, straight, with 2 spines, without denticulate patch near posterior margin, palm extremely acute, margin convex, serrate, posterodistal corner with 1 medial and 1 lateral spines; dactylus simple, without subterminal teeth or spines. *Gnathopod 2* : minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 2.8 times breadth; carpus long, length 3.1 times breadth, posterior margin straight; propodus subrectangular, short, length 1.7 times breadth, posterior margin without strong distal spines, palm transverse, with straight, serrate margin, posterodistal corner with 5 medial and 4 lateral spines; dactylus not reaching corner of palm, posterior margin serrate.

Peraeopod 3 : coxa large; merus not expanded anteriorly, male merus-carpus without plumose setae, female not known; propodus with 4 spines and 1 distal spine along posterior margin; dactylus long, slender. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior margin rounded, posterior margin sloping anteriorly; merus not expanded anteriorly, male merus-carpus without plumose setae; propodus with 4 spines and 1 distal spine along posterior margin; dactylus long, slender. *Peraeopod 5* : coxa equilobate; basis expanded with posterior margin smooth; merus expanded with rounded posterior margin; propodus with 5 spines, 4 setae and 2 distal spines along anterior margin; dactylus long, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis slightly expanded posteriorly with weakly crenate posterior margin, without anteroventral lobe; merus not expanded posteriorly; propodus posterior margin 5 spines, 5 setae and 1 distal spine along anterior margin; dactylus long, slender, straight and closing along palm of propodus. *Peraeopod 7* : basis expanded posteriorly, posterior margin rounded, minutely crenate, posteroventral corner rounded, posteroventral margin straight; merus not expanded posteriorly with 2 spines; propodus and dactylus unknown.

Gills : from gnathopod 2 to peraeopod 7, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner rounded. *Epimeron 3* : posteroventral corner produced into small, broad tooth. *Urosomites* : dorsally smooth; urosomite 3 without small dorsolateral spine. *Uropod 1* : without fine setae; peduncle with 9 dorsolateral, 1 apicolateral, 9 dorsomedial and 1 apicomedial spines; outer ramus slightly longer than inner ramus, outer ramus with 1 lateral spine; inner ramus with 2 medial and 3 lateral spines. *Uropod 2* : without fine setae; peduncle without dorsolateral flange, with 4 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial spines, without spines along distal margin; outer ramus slightly longer than inner ramus, outer ramus with 5 lateral spines in weak acclivities; inner ramus with 3 medial and 5 lateral spines, inner ramus without constriction. *Uropod 3* : peduncle well developed, short, length 1.4 times breadth, without dorsolateral flange, with 1 apicolateral and 3 apicomedial spines, without midlateral spines or setae, with 4 distoventral spines, with 8 simple setae; rami lanceolate, subequal in length, outer ramus 2-articulate, article 2 short, article 1 with 8 lateral spines; inner ramus with 2 medial and 6 lateral spines, plumose setae present in male. *Telson* : longer than broad, length 1.2 times breadth, deeply cleft (75%), with 2 dorsal spines on each lobe, distal margins oblique, without marginal penicillate setae or simple marginal setae, with 1 marginal spine on each lobe.

ETYMOLOGY. — Named for the town of Vao on the Isle of Pines.

Source : MNHN, Paris

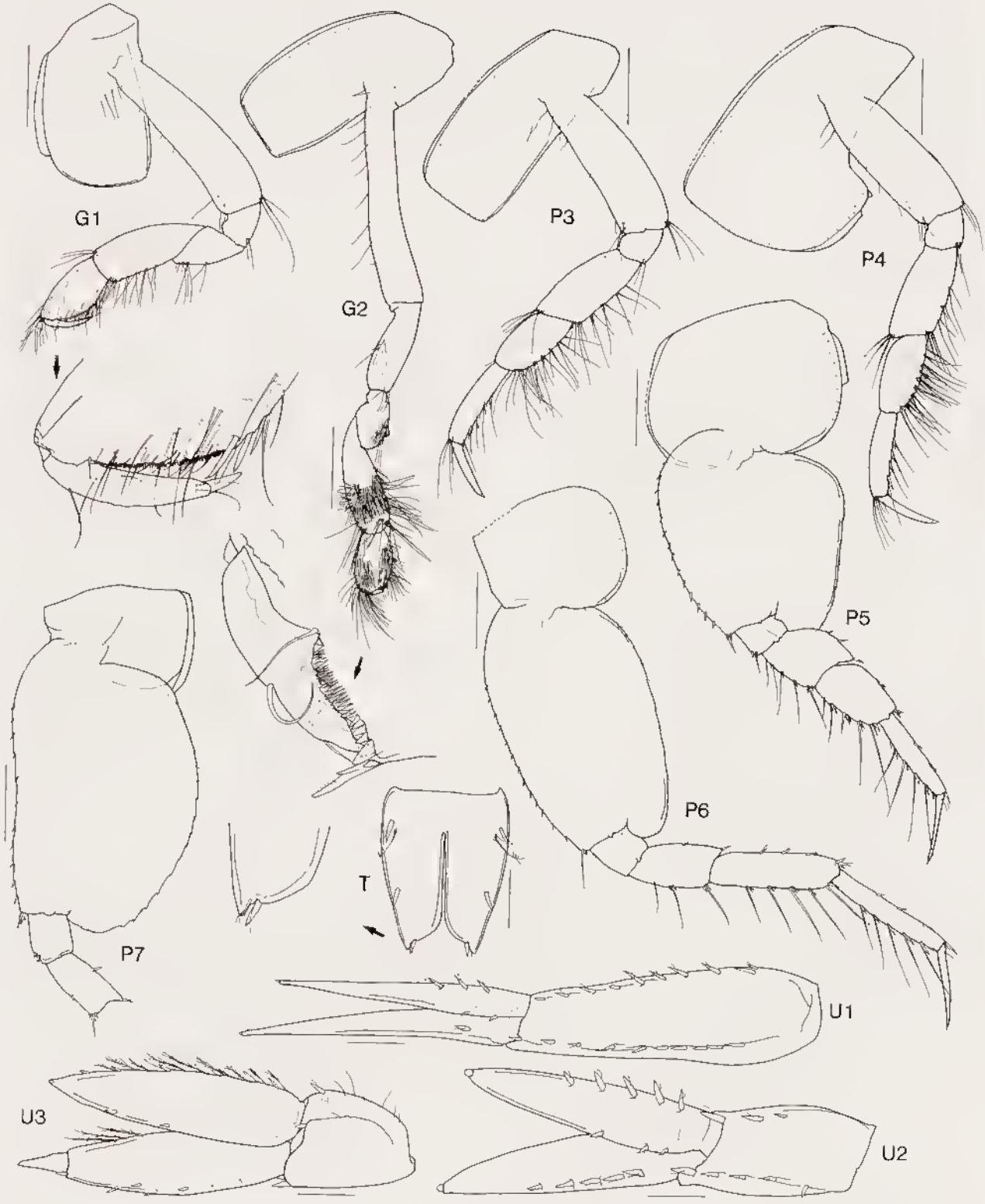

FIG. 21. — *Hippomedon vao* sp. nov., holotype male, 10 mm (MNHN-Am 4444), south of the Isle of Pines, New Caledonia. Scales for U1-3 represent 0.2 mm, remainder represent 0.5 mm.

Source : MNHN, Paris

REMARKS. — According to JARRETT and BOUSFIELD (1982) this species belongs in the large genus *Hippomedon*. *Hippomedon vao* occurs in the group of species without the notched tooth on epimeron 3 and with a short telson. It is most closely related to *Hippomedon bandae* Pirlot, 1933, from the Banda Sea, Indonesia. Both species have a weakly developed posteroventral tooth on epimeron 3 and a short telson, but the bases of peraeopods 5 and 7 are longer and more slender in *H. bandae* and the inner ramus of uropod 2 is shorter than the outer.

DISTRIBUTION. — *Hippomedon vao* is known from southern New Caledonia, in 440 to 860 m depth.

Genus *ICHNOPUS* Costa, 1853

Ichnopus malpatun Lowry & Stoddart, 1992

Ichnopus malpatun Lowry & Stoddart, 1992 : 210, figs 15-16.

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn DW 150, 19°23.40'S, 163°22.70'E, north of the Belep Isles, 110 m, 14 September 1985 : 2 ♂ (MNHN-Am 4402).
CHALCAL 2 : stn DW 80, 23°26.70'S, 168°01.80'E, south of the Isle of Pines, 80-160 m, 31 October 1986 : 1 ♂ (MNHN-Am 4432).

DISTRIBUTION. — *Ichnopus malpatun* is known from outside the barrier reef, Madang Lagoon, northern Papua New Guinea (95 m); off the Grand Passage, northern New Caledonia (110 to 165 m) and off the Isle of Pines, southern New Caledonia (80 to 160 m).

Genus *KERGUELENIA* Stebbing, 1888

Kerguelenia Stebbing, 1888 : 1219; 1906 : 11. . — SARS,1891 : 119. — DELLA VALLE, 1893 : 786. — STEPHENSEN, 1929 : 51. — J.L. BARNARD, 1969 : 346. — LEDOYER, 1986 : 770. — DIVIACCO & RUFFO, 1989 : 488. — BARNARD & KARAMAN, 1991 : 493.

DIAGNOSIS. — Mandible : incisor, lacinia mobilis, accessory spine row and molar all absent. Maxilla 1 : inner plate reduced, without apical setae; outer plate with reduced number of spine-teeth. Maxilliped : inner and outer plates reduced in size and spination. Gnathopod 1 : simple, linear. Peraeopod 4 : coxa with very large posteroventral lobe. Peraeopod 5 : basis linear to moderately expanded. Uropod 3 : inner ramus reduced or absent.

TYPE SPECIES. — *Kerguelenia compacta* Stebbing, 1888, by monotypy.

SPECIES COMPOSITION. — The genus contains 15 taxa : *Kerguelenia adeliensis* Bellan-Santini, 1972; *K. antarctica* K.H. Barnard, 1930; *K. antiborealis* Bellan-Santini & Ledoyer, 1987; *K. borealis* Sars, 1891; *K. b. japonica* Gurjanova, 1962; *K. b. ochotica* Gurjanova, 1962; *K. compacta* Stebbing, 1888; *K. eoa* Gurjanova, 1962; *K. glacialis* Schellenberg, 1926a; *K. koutoumo* sp. nov.; *K. lifou* sp. nov.; *K. macropoda* Ledoyer, 1986; *K. microphthalma* Ledoyer, 1986; *K. palpalis* K.H. Barnard, 1932; *K. reducta* Ledoyer, 1977.

DISTRIBUTION. — *Kerguelenia* is a cosmopolitan genus occurring in 15 to 3700 m depth.

Kerguelenia koutoumo sp. nov.

Figs 22-24

MATERIAL EXAMINED. — **New Caledonia.** CALSUB : stn PL 20, 22°52.7'S, 167°23'E, south of the Isle of Pines, 555-616 m, 10 March 1989 : 1 ♂, 4.0 mm (MNHN-Am 4782); 1 ♀, 4.2 mm, 1 juvenile (MNHN-Am 4783).

Source : MNHN, Paris

TYPES. — The male, 4.0 mm (MNHN-Am 4782) is the holotype. The female and juvenile are paratypes.

TYPE LOCALITY. — South of the Isle of Pines, New Caledonia, 22°52.7'S, 167°23'E, 555 to 616 m.

DIAGNOSIS. — Eyes apparently absent. Maxilla 1: palp 1-articulate. Antenna 1 : peduncular article 1 produced dorsodistally. Peraeopod 5 : basis slightly expanded posteriorly. Peraeopod 7 : merus, anterior and posterior margins subparallel, strongly produced posteroventrally, extending beyond carpus. Uropod 3 biramous.

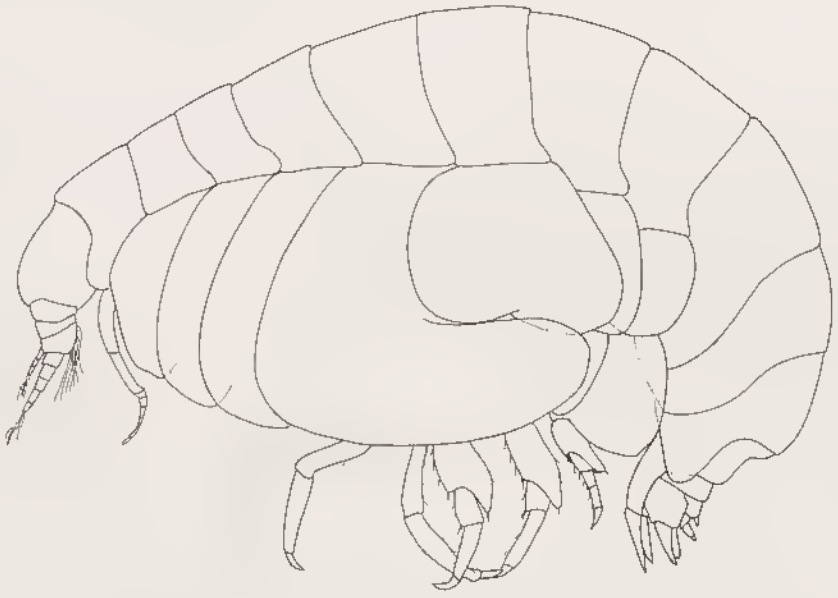

FIG. 22. — *Kerguelenia koutoumo* sp. nov., holotype male, 4.0 mm (MNHN-Am 4782), south of the Isle of Pines, New Caledonia.

DESCRIPTION. — Based on holotype male, 4.0 mm and paralype female 4.2 mm. *Head* : exposed, slightly longer than deep, ventrally truncated with straight ventral margin; lateral cephalic lobe small, narrowly rounded; rostrum absent; eyes apparently absent. *Antenna 1* : medium length, 0.2 times body; peduncular article 1 short, length 1.3 times breadth, without dorsal crest or tooth on distomedial margin, with anterodistal lobe reaching halfway along article 2; peduncular article 2 short, 0.27 times article 1, without anterodistal projection; peduncular article 3 long, 0.23 times article 1; accessory flagellum long, 0.56 times primary flagellum 3- to 4-articulate, article 1 long, 2 times article 2 (male long, 2.2 times article 2); flagellum 5-articulate (male 6), without callynophore in female (strong 1-field in male). *Antenna 2* : subequal in length to antenna 1 (same in male); peduncle without brush setae in female or male, male weakly geniculate between peduncular articles 3-4, article 3 short, 0.52 times article 4; flagellum well developed, 5-articulate in male.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : fused, straight. *Mandible* : incisors absent; laciniae mobilis absent; molar absent; mandibular palp attached extremely distally; article 1 short, length 0.73 times breadth; article 2 broad, length 3.2 times breadth, 1.2 times article 3, with 8 submarginal posterodistal A2-setae, without D2-setae; article 3 slender, blade-like, long, length 3.6 times breadth, without proximal A3-setae, with 11-14 D3-setae along most of posterior margin and 2 apical E3-setae. *Maxilla 1* : inner plate absent; outer plate narrow, with 5 spine-teeth in modified 7/4 arrangement; outer row with ST1 to ST3 small, stout, weakly cuspidate, ST4-ST5 absent, ST6 small, stout, 5-cuspidate, ST7 slightly displaced from ST6, small, stout, 2-cuspidate; inner row with STA-STD absent; palp large, 1-articulate, with smooth apical margin, with 2 subterminal setae, flag spine absent, distomedial margin smooth. *Maxilla 2* : inner and outer plates narrow; inner plate about 0.5 times length outer plate. *Maxilliped* : inner plate small, subrectangular, with 1 apical nodular spine, oblique setal row absent; outer plate vestigial, subrectangular, without apical setae or spines, with 1 apical

Source : MNHN, Paris

tooth, without medial spines, submarginal setae long, simple; palp large, 4-articulate; article 2 broad, length 1.7 times breadth, 1 times article 3; article 3 long, broad, length 1.8 times breadth; dactylus well developed, with 2 subterminal setae, unguis absent.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : simple; coxa large, slightly shorter than coxa 2, tapering, anterior margin slightly convex, anteroventral corner rounded, posterior margin straight; basis long, slender, length

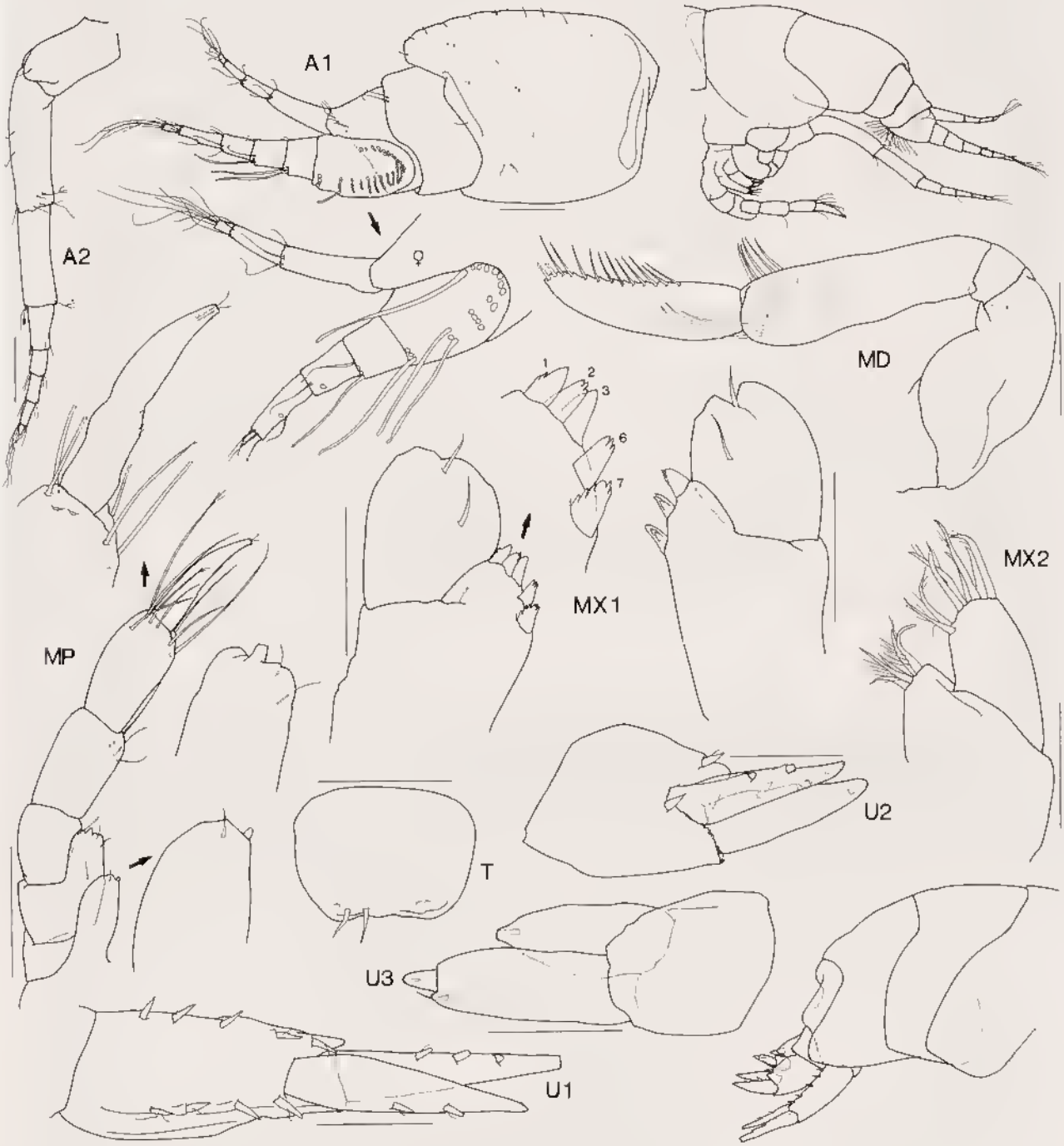

FIG. 23. — *Kerguelenia koutoumo* sp. nov., holotype male, 4.0 mm (MNHN-Am 4782); paratype female, 4.2 mm (MNHN-Am 4783); south of the Isle of Pines, New Caledonia. Scales for MX1, MX2, U3, T represent 0.05 mm, remainder represent 0.1 mm.

Source : MNHN, Paris

5 times breadth, anterior margin smooth, with simple setae; ischium long, length 3.1 times breadth; merus, posterior margin with a few simple setae; carpus subrectangular, very long, length 5.5 times breadth and 1 times, without denticulate patch near posterodistal margin; propodus large, subrectangular, length 7 times breadth, margins subparallel, posterior margin smooth, slightly concave, with setae, without denticulate patch near posterior margin, palm absent; dactylus simple, with large plumose seta. *Gnathopod 2* : minutely chelate; coxa

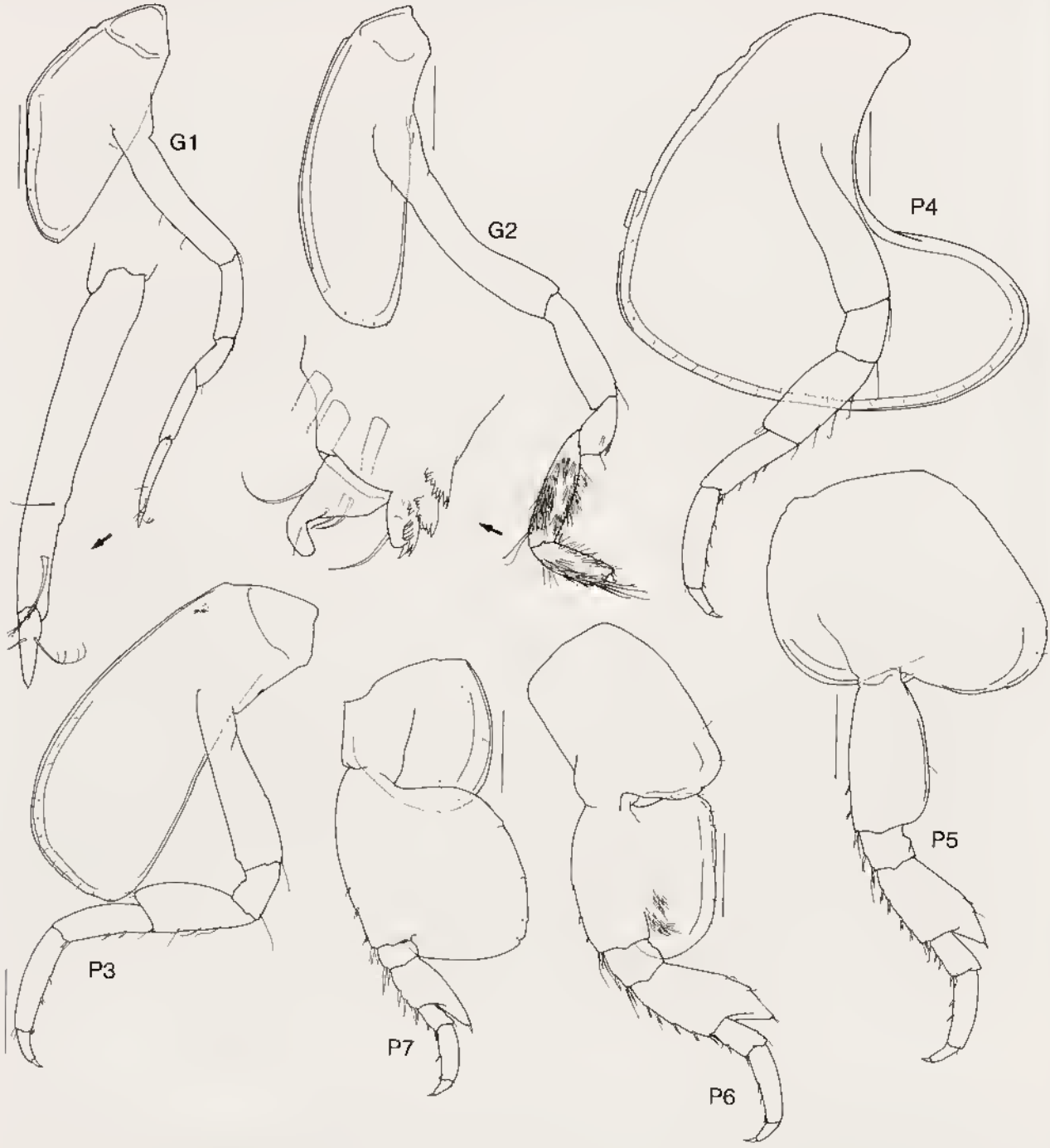

FIG. 24. — *Kerguelenia koutoumo* sp. nov., holotype male, 4.0 mm (MNHN-Am 4782), south of the Isle of Pines, New Caledonia. Scales represent 0.1 mm.

Source : MNHN, Paris

large, subequal in size to coxa 3; ischium long, length 3.1 times breadth; carpus long, length 3.7 times breadth, posterior margin straight; propodus subrectangular, long, length 2.7 times breadth, palm obtuse, with convex, smooth margin, posterodistal corner without spines; dactylus over-reaching corner of palm, posterior margin smooth.

Peraeopod 3 : coxa large; merus weakly expanded anteriorly; propodus with 2 spines and 2 distal spines along posterior margin; dactylus short, stocky. *Peraeopod 4* : coxa wider than deep, with very large posteroventral lobe, anterior margin rounded, posterior margin of lobe evenly rounded; merus weakly expanded anteriorly; propodus with 3 spines and 1 distal spine along posterior margin; dactylus short, stocky. *Peraeopod 5* : coxa bilobate, posterior lobe produced distoventrally; basis slightly expanded posteriorly, without posteroventral lobe; merus expanded, posterior margin rounded, produced distally along carpus; propodus with 2 spines along anterior margin; dactylus short, stocky. *Peraeopod 6* : coxa large, not lobate posteriorly; basis expanded posteriorly with smooth posterior margin, without anteroventral lobe; merus expanded, posterior margin rounded, produced distalty along carpus; propodus with 2 spines and 2 distal spines along anterior margin; dactylus short, stocky. *Peraeopod 7* : basis expanded posteriorly, posterior margin almost straight, smooth, posteroventral corner rounded, posteroventral margin rounded; merus expanded, anterior and posterior margins subparallel, produced posterodistally beyond carpus; propodus with 1 spine and 2 distal spines along anterior margin and 2 setae along posterior margin; dactylus short, stocky.

Oostegites : on peraeopods 4 and 5 (buds). *Gills* : from gnathopod 2 to peraeopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 3* : posteroventral corner produced, narrowly rounded. *Urosomites* : urosomite 1 with anterodorsal notch. *Uropod 1* : peduncle with 4 dorsolateral, 1 apicolateral, 3 dorsomedial and 1 apicomedial spines; outer ramus slightly longer than inner ramus, outer ramus with 3 dorsal spines; inner ramus with 2 dorsal spines. *Uropod 2* : peduncle with large dorsolateral flange, with 1 apicolateral and 1 apicomedial spines, without spines along distal margin; outer ramus slightly longer than inner ramus, outer ramus with 2 dorsal spines; inner ramus with 2 dorsal spines, without constriction. *Uropod 3* : peduncle welt developed, short, length 1.1 times breadth, without dorsolateral flange, without dorsal spines, without midlateral spines or setae, without distoventral spines; biramous, rami lanceolate, inner ramus reduced, about 0.63 times outer ramus, outer ramus 2-articulate, article 2 short, rami without spines. *Telson* : shorter than broad, length 0.73 times breadth, entire, without dorsal setae, distal margin emarginate, with 5-6 marginal penicillate setae, without simple marginal setae or marginal spines.

ETYMOLOGY. — Named for Koutoumo, the island nearest the type locality.

REMARKS. — *Kerguelenia koutoumo* is compared to species with biramous third uropods, such as *K. adeliensis*, the *K. borealis* complex, *K. microphthalma* and *K. palpalis*. It differs from *K. adeliensis* by the less rounded basis and greatly extended merus of peraeopod 7. It differs from the other three species by not having a posteroventral lobe on the basis of peraeopod 5. *Kerguelenia koutoumo* is easily distinguished from *K. lifou* by the propodus of peraeopods 3 to 7 which are more spinose, not setose, uropods 1 to 3 which are more spinose and uropod 3 which has well developed rami.

DISTRIBUTION. — *Kerguelenia koutoumo* is known from southern New Caledonia, in 580 m depth.

Kerguelenia lifou sp. nov.

Figs 25-27

MATERIAL EXAMINED. — **Loyalty Islands.** BIOGEOCAL : stn CP 373, 21°01.53'S, 166°57.41'E, south-west of Point Lefèvre, Lifou, 1920-2040 m, 20 April 1987 : 1 ♀ 4.4 mm (MNHN-Am 4459).

TYPES. — The unique specimen is the holotype.

TYPE LOCALITY. — South-east of Point Lefèvre, Lifou, Loyalty Islands, 21°01.53'S, 166°57.41'E, 1920 to 2040 m.

Source : MNHN, Paris

DIAGNOSIS. — Eyes apparently absent. Maxilla 1 : palp 2-articulate. Antenna 1 : peduncular article 1 not produced dorsodistally. Peraeopod 5 : basis slightly expanded posteriorly. Peracopod 7 : merus expanded posterodistally with slightly convex posterodistal margin, strongly produced posteroventrally, extending beyond carpus. Uropod 3 uniramous.

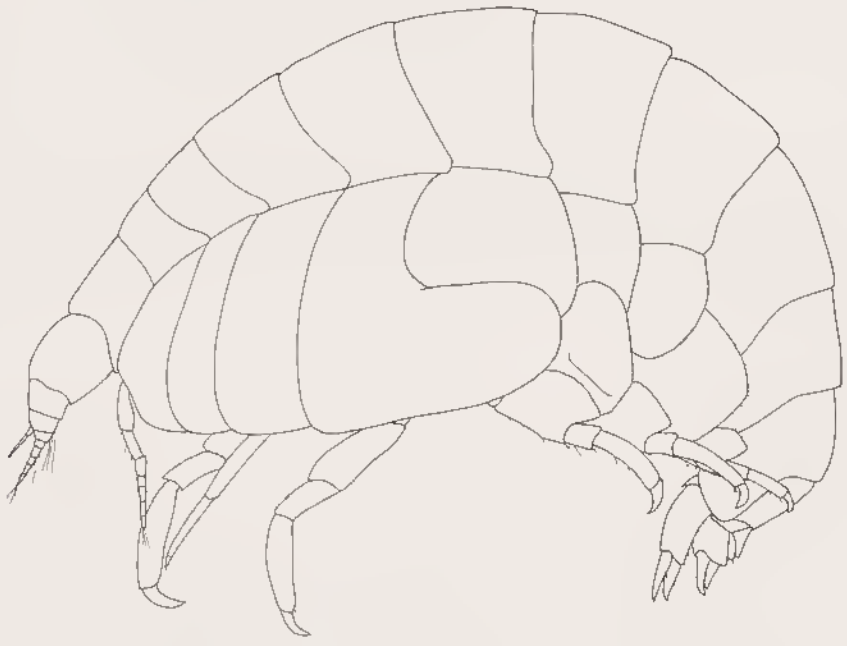

FIG. 25. — *Kerguelenia lifou* sp. nov., holotype female, 4.4 mm (MNHN-Am 4459), south-west of Point Lefèvre, Lifou, Loyalty Islands.

DESCRIPTION. — Based on holotype female, 4.4 mm; male not known. *Head* : exposed, slightly longer than deep, ventrally truncated with straight ventral margin; lateral cephalic lobe small, narrowly rounded; rostrum absent; eyes apparently absent. *Antenna 1* : short, 0.15 times body; peduncular article 1 short, length 1.2 times breadth, without dorsal crest, without tooth on distomedial margin, without anterodistal projection; peduncular article 2 short, 0.38 times article 1, without anterodistal projection; peduncular article 3 long, 0.34 times article 1; accessory flagellum long, 0.55 times primary flagellum, 3-articulate, article 1 short, 1.3 times article 2; flagellum 6- to 7-articulate, without callynophore in female. *Antenna 2* : slightly longer than antenna 1; peduncle without brush setae, female weakly geniculate between peduncular articles 3-4, article 3 long, 0.78 times article 4; flagellum well developed, 6-articulate, without thick setal brush.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : fused, straight. *Mandible* : incisors absent; laciniae mobilis absent; molar absent; mandibular palp attached extremely distally; article 1 short, length 1 times breadth; article 2 slender, length 5.9 times breadth, 1.7 times article 3, with 2 submarginal posterodistal A2-setae, without D2-setae; article 3 slender, blade-like, long, length 4 times breadth, without proximal A3-setae, with 4 distal D3-setae and 1 apical E3-setae. *Maxilla 1* : inner plate absent; outer plate narrow, with 5 spine-teeth in modified 7/4 arrangement; outer row with ST1 to ST3 small, stout, weakly cuspidate, ST4-ST5 absent, ST6 small, stout, 2-cuspidate, ST7 slightly displaced from ST6, small, stout, 2-cuspidate; inner row with STA-STD absent; palp large, 2-articulate, with 1 long terminal spine, with 1 subterminal seta, flag spine present on distolateral corner, medial margin finely setose. *Maxilla 2* : inner and outer plates narrow. *Maxilliped* : inner plate small, subrectangular, with 1 apical nodular spine, oblique setal row absent; outer plate vestigial, subrectangular, without apical setae, without apical spines, with 1-2 apical teeth, without medial spines, submarginal setae long, simple; palp large, 4-articulate; article 2 slender, length 2.3 times breadth, 1 times article 3; article 3 very long, slender, length 2.8 times breadth; dactylus well developed, with 1 subterminal seta, unguis absent.

Source : MNHN, Paris

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : simple; coxa large, as long as coxa 2, anterior margin slightly convex, anteroventral corner rounded, posterior margin straight; basis long, stender, length 4.4 times breadth, anterior margin smooth, with simple setae; ischium very long, length 4.7 times breadth; merus, posterior margin with a few simple setae; carpus subrectangular, very long, length 4.2 times breadth and 1 times propodus, without denticulate patch near posterodistal margin; propodus large, subtriangular, length 4.9 times breadth, margins slightly converging distally, posterior margin smooth, subtly sinusoidal, with setae, without denticulate patch near posterior margin, palm absent; dactylus simple, with large plumose seta. *Gnathopod 2* : minutely chelate; coxa large, subequal in size to coxa 3; ischium long, length 3.8 times breadth; carpus long, length 3.3 times breadth, posterior margin straight; propodus subrectangular, long, length 2 times breadth, palm obtuse, with straight, serrate margin, posterodistal corner without spines; dactylus over-reaching corner of palm, posterior margin serrate.

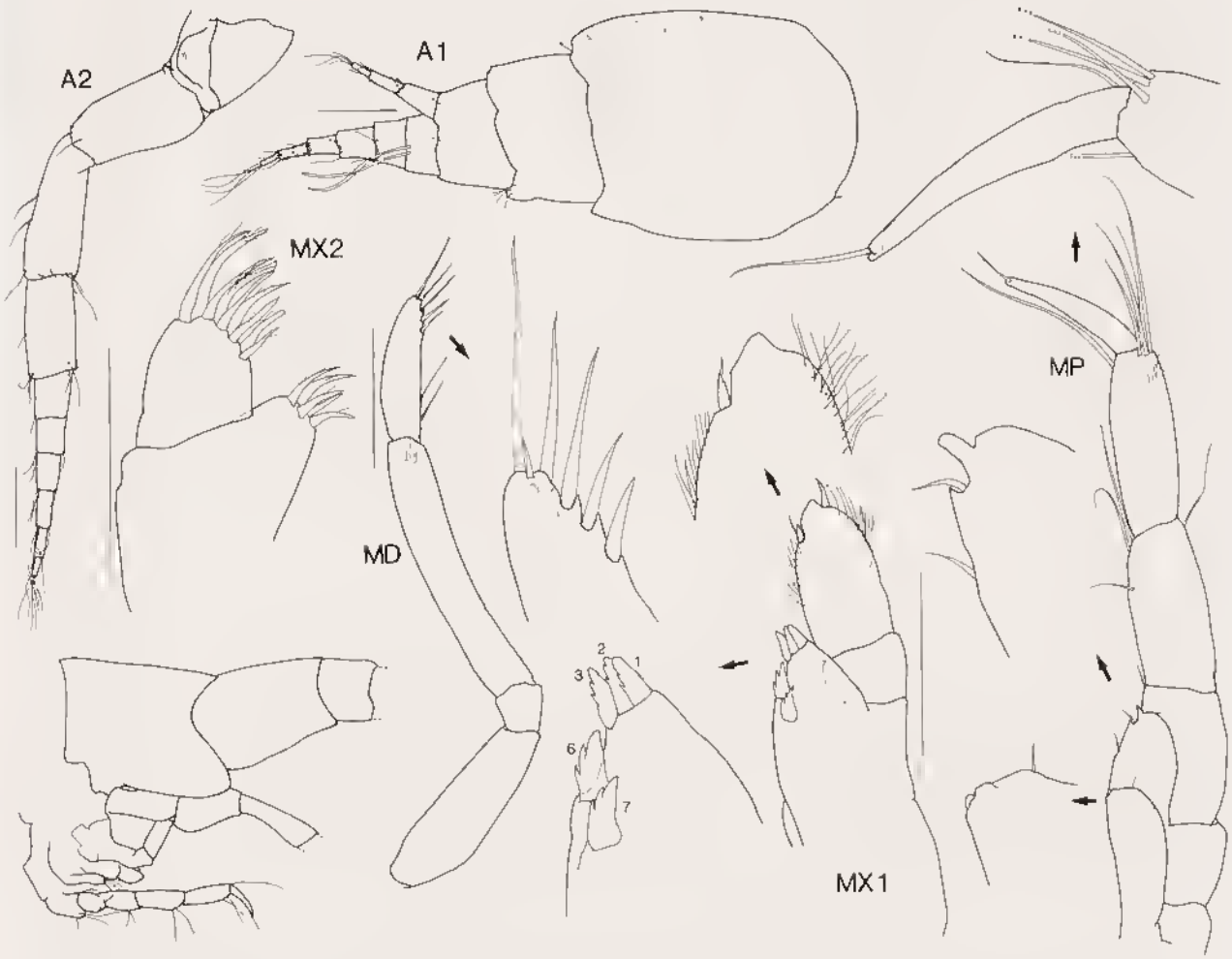

FIG. 26. — *Kerguelenia lifou* sp. nov., holotype female, 4.4 mm (MNHN-Am 4459), south-west of Point Lefèvre, Lifou, Loyalty Islands. Scales represent 0.1 mm.

Peraeopod 3 : coxa large; merus slightly expanded anteriorly; propodus with 1 seta and 1 distal spine along posterior margin; dactylus short, stocky. *Peraeopod 4* : coxa wider than deep, with very large posteroventral lobe, anterior margin rounded, posterior margin of lobe evenly rounded; merus weakly expanded anteriorly; propodus with 3 setae and 1 distal spine along posterior margin; dactylus short, stocky. *Peraeopod 5* : coxa bilobate, posterior lobe strongly produced ventrally; basis slightly expanded posteriorly, without posteroventral lobe; merus

Source : MNHN, Paris

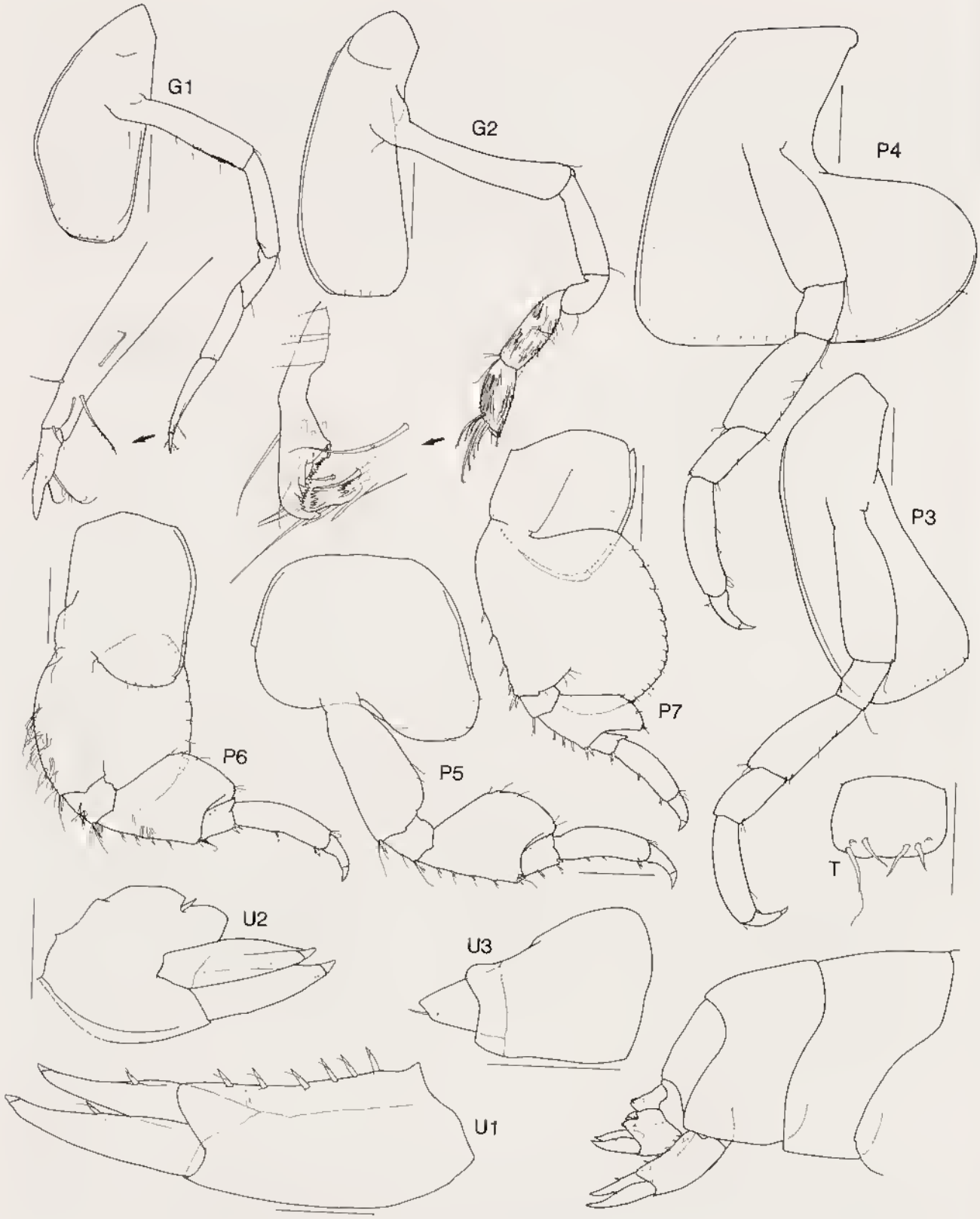

FIG. 27. — *Kerguelenia lifou* sp. nov., holotype female, 4.4 mm (MNHN Am 4459), south-west of Point Lefèvre, Lifou, Loyalty Islands. Scales for U3, T represent 0.05 mm, remainder represent 0.1 mm.

Source : MNHN, Paris

broadly expanded with sloping posterior shoulder and straight posterior margin; propodus with 2 spines and 2 distal spines along anterior margin; dactylus short, stocky. *Peraeopod 6* : coxa large, not lobate posteriorly; basis expanded posteriorly with smooth posterior margin, without anteroventral lobe; merus broadly expanded with sloping posteroproximal shoulder and straight posterior margin; propodus with 1 spines and 2 distal spines along anterior margin; dactylus short, stocky. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus distally expanded, slightly convex posterior margin with 4 setae; propodus with 1 spine and 2 distal spines along anterior margin and 2 setae along posterior margin; dactylus short, stocky.

Oostegites : on peraeopod 5 only (bud). *Gills* : from gnathopod 2 to peraeopod 6, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 3* : posteroventral corner subquadrate. *Urosomites* : dorsally smooth. *Uropod 1* : peduncle with 6 dorsolateral and 1 apicomedial spines; outer ramus slightly longer than inner ramus, outer ramus with 1 dorsal spine; inner ramus with 1 dorsal spine. *Uropod 2* : peduncle with large dorsolateral flange, with 1 dorsolateral spine, without spines along distal margin; outer ramus slightly longer than inner ramus, outer ramus with 1 dorsal spine; inner ramus without spines, without constriction. *Uropod 3* : peduncle well developed, short, length 1.2 times breadth, without dorsolateral flange, without dorsal spines, midlateral spines or setae or distoventral spines; uniramous, ramus 1-articulate, without spines. *Telson* : shorter than broad, length 0.67 times breadth, entire, without dorsal setae, distal margins truncated, with 6 marginal penicillate setae, without simple marginal setae or marginal spines.

ETYMOLOGY. — Named for the island of Lifou in the Loyalty Islands.

REMARKS. — Compared to other species with uniramous third uropods *K. lifou* differs from *K. eoa* and *K. glacialis* in having a slightly expanded linear basis on peraeopod 5 without a posteroventral lobe. It further differs from *K. glacialis* in not having a produced posteroventral corner on epimeron 3. It is remarkably similar to *K. compacta*, but *K. compacta* has well defined eyes and the merus on peraeopods 5 to 7 is less expanded posteriorly. *Kergueleria antarctica* has a dorsodistal lobe on the first peduncular article of antenna 1 and *K. macropoda* has an enormously expanded and distally produced basis on peraeopod 7.

DISTRIBUTION. — *Kergueleria lifou* is known from the Loyalty Islands Basin, South-West Pacific Ocean, in 1920 to 2040 m depth.

Genus *LEPIDEPECREELLA* Schellenberg, 1926a

Lepidepecreella Schellenberg, 1926a : 281. — STEPHENSEN, 1931 : 6; 1935 : 101. — J.L. BARNARD, 1966 : 68; 1969 : 347. — LEDOYER, 1986 : 774. — BARNARD & KARAMAN, 1991 : 494.
Paracyclocaris K.H. Barnard, 1930 : 321 (type species : *Paracyclocaris bidens* K.H. Barnard, 1930, originat designation).

DIAGNOSIS. — Head deeper than long with well developed anterior keel. Mouthparts subconical. Maxilla 1 : outer plate with 11 spine-teeth in a 7/4 arrangement. Gnathopod 1 : simple, slender, elongate, attenuate with coxa vestigial. Gnathopod 2 : coxa vestigial. Telson short, entire.

TYPE SPECIES. — *Lepidepecreella ctenophora* Schellenberg, 1926, by monotypy.

SPECIES COMPOSITION. — *Lepidepecreella* contains 9 species : *L. bidens* (K.H. Barnard, 1930); *L. charno* J.L. Barnard, 1966; *L. ctenophora* Schellenberg, 1926a; *L. cymba* (Goes, 1866); *L. emarginata* Nicholls, 1938; *L. ovalis* K.H. Barnard, 1932; *L. pamanzi* Ledoyer, 1986; *L. sarcelle* sp. nov. and *L. tridactyla* Bellan-Santini, 1972.

DISTRIBUTION. — *Lepidepecreella* is mainly a bipolar genus (tropically submergent in bathyal basins) occurring down to 2500 m depth.

Source : MNHN, Paris

Lepidepecreella sarcelle sp. nov.

Figs 28-29

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn CP 75, 22°18.65'S, 167°23.30'E, north of the Isle of Pines, 825-860 m, 4 September 1985 : 1 specimen, sex not known, 3+ mm (incomplete) (MNHN-Am 4383).

TYPES. — The unique specimen is the holotype.

TYPE LOCALITY. — North of the Isle of Pines, New Caledonia, 22°8.65'S, 167°23.30'E, 825 to 860 m.

DIAGNOSIS. — Gnathopod 1 : dactylus without convex posterior margin. Gnathopod 2 : palm slightly obtuse with serrate margin. Peraeopod 5 ; basis with weakly developed posterodistal lobe.

DESCRIPTION. — Based on holotype, sex not known. *Head* : exposed, much deeper than long, extending well below insertion of antenna 2 with notch at level of insertion; lateral cephalic lobe small, subacute; rostrum small; eyes oval. *Antenna 1* : short; peduncular article 1 medium, length 1.5 times breadth, without dorsal crest, midmedial swelling or anterodistal projection; peduncular article 2 short, 0.36 times article 1, without anterodistal projection; peduncular article 3 long, 0.24 times article 1; accessory flagellum long, 0.61 times primary flagellum, 5-articulate, article 1 long, 2 times article 2; flagellum 7-articulate, with strong 2-field callynophore, without setae or spines. *Antenna 2* : subequal in length to antenna 1; peduncle without brush setae, weakly geniculate between peduncular articles 3-4, article 3 short, 0.37 times article 4; flagellum well developed, 7-articulate, without thick setal brush.

Mouthpart bundle : subconical. *Epistome* and *upper lip* : fused, forming a strongly projecting subacute tooth between antennae 1 and 2. *Mandible* : incisors symmetrical, small, with slightly convex margins; left lacinia mobilis present, a cuspidate peg; molar vestigial; mandibular palp attached proximally; article 1 short, length 1.25 times breadth; article 2 slender, length 3 times breadth, 0.78 times article 3, without A2-setae or D2-setae; article 3 falcate, strongly tapering distally, long, length 3.9 times breadth, without proximal A3-setae, with 6 proximal D3-setae and 1 apical E3-seta. *Maxilla 1* : inner plate narrow without apical setae; outer plate broad with 11 spine-teeth in 7/4 arrangement; outer row with ST1 to ST3 small, stout, multicuspidate, ST4-ST5 small, stout, 6-cuspidate, ST6 small, stout, 4-cuspidate, ST7 contiguous with ST6, small, shorter than ST6, slender, 5-cuspidate medially; inner row with STA large, broad, 1-cuspidate, STB-STD small, stout, 2-cuspidate; palp large, 2-articulate, with serrate apical margin, without subterminal setae, flag spine absent, distomedial margin smooth. *Maxilla 2* : inner plate broad, outer plate narrow, inner plate 1 times length outer plate. *Maxilliped* : inner plate very large, subrectangular, with 3 apical nodular spines, oblique setal row reduced with 5 raker spines; outer plate small, subovate, without apical setae, apical spines or apical teeth, without medial spines or submarginal setae; palp large, 4-articulate; article 2 very broad, length 1.5 times breadth, 1.1 times article 3; article 3 short, broad, length 2 times breadth; dactylus well developed, with 1 subterminal seta, unguis present.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : simple; coxa vestigial; basis long, slender, length 3.8 times breadth, anterior margin smooth, with simple setae; ischium long, length 3.5 times breadth; merus, posterior margin without setae; carpus subrectangular, long, length 3.7 times breadth, shorter than (0.7 times) propodus, without denticulate patch near posterodistal margin; propodus very long, linear, subrectangular, length 5.6 times breadth, margins slightly converging distally, posterior margin smooth, slightly concave, without spines or setae, without denticulate patch near posterior margin, palm absent; dactylus complex, extremely attenuated with distally serrate posterior margin, with long uniserrate spine and short smooth curved spine. *Gnathopod 2* : minutely subchelate; coxa vestigial; ischium long, length 2.5 times breadth; carpus very long, length 4.5 times breadth, posterior margin straight; propodus subrectangular, long, length 3.1 times breadth, palm slightly obtuse, with convex, minutely serrate margin, posterodistal corner with 1 medial spine; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3 : coxa large; merus expanded anterodistally along carpus; propodus with 5 spines and 2 distal spines along posterior margin; dactylus long, stocky. *Peraeopod 4* : coxa as deep as wide, with acutely produced posteroventral lobe, anterior margin rounded, posterior margin sloping anteriorly; merus expanded anterodistally

Source : MNHN, Paris

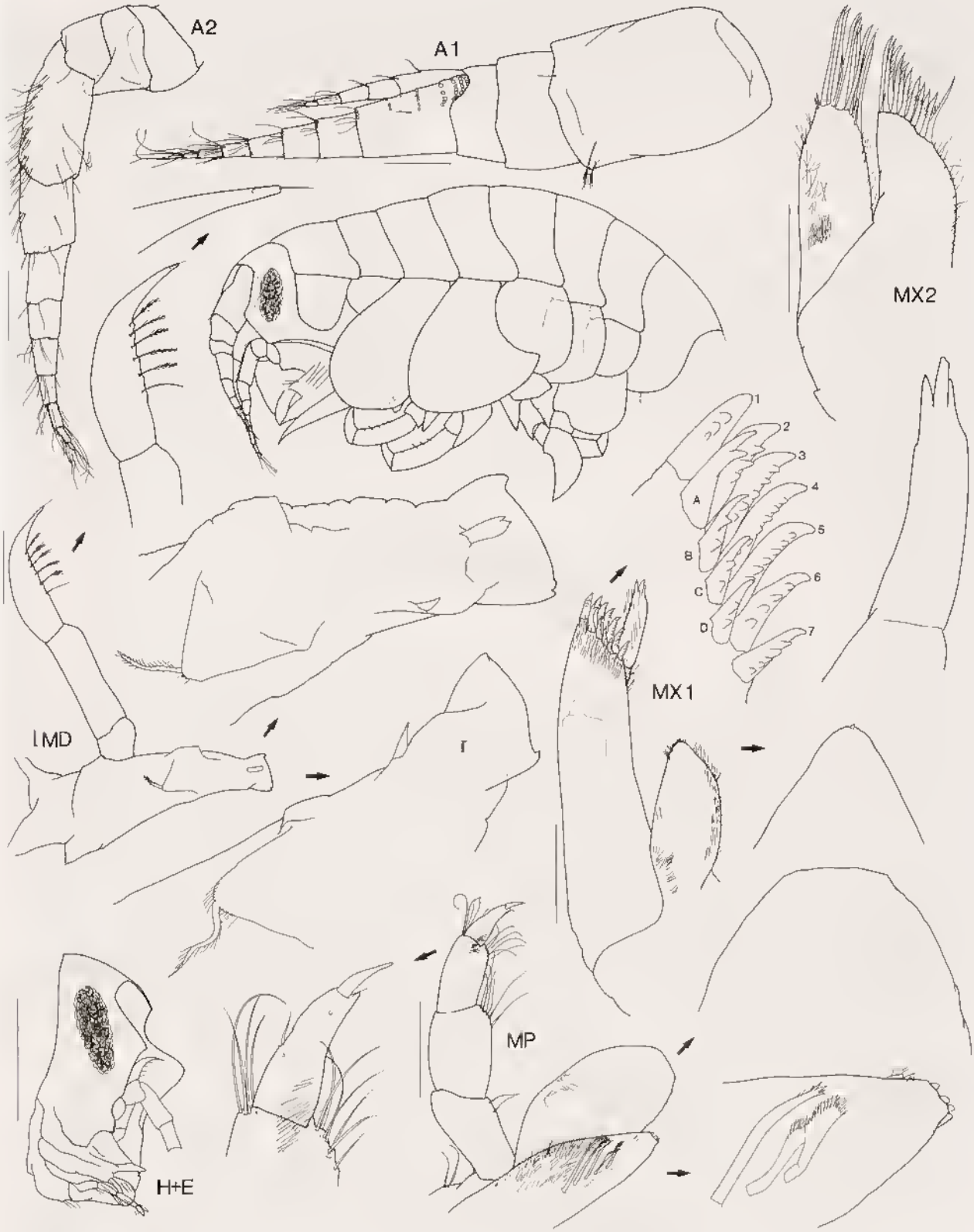

FIG. 28. — *Lepidepecreella sarcelle* sp. nov., holotype, sex not known, 3+ mm (MNHN-Am 4383), north of the Isle of Pines, New Caledonia. Scale for H+E represents 0.5 mm, remainder represent 0.1 mm.

Source : MNHN, Paris

along carpus; propodus with 5 spines and 2 distal spines along posterior margin; dactylus long, stocky. *Peraeopod 5* : coxa bilobate, posterior lobe strongly produced ventrally; basis weakly expanded, posterior margin concave, posteroventral lobe extending along ischium; merus expanded, posterior margin rounded, produced distally along carpus; propodus with 5 spines along anterior margin and 2 distal spines; dactylus long, stocky.

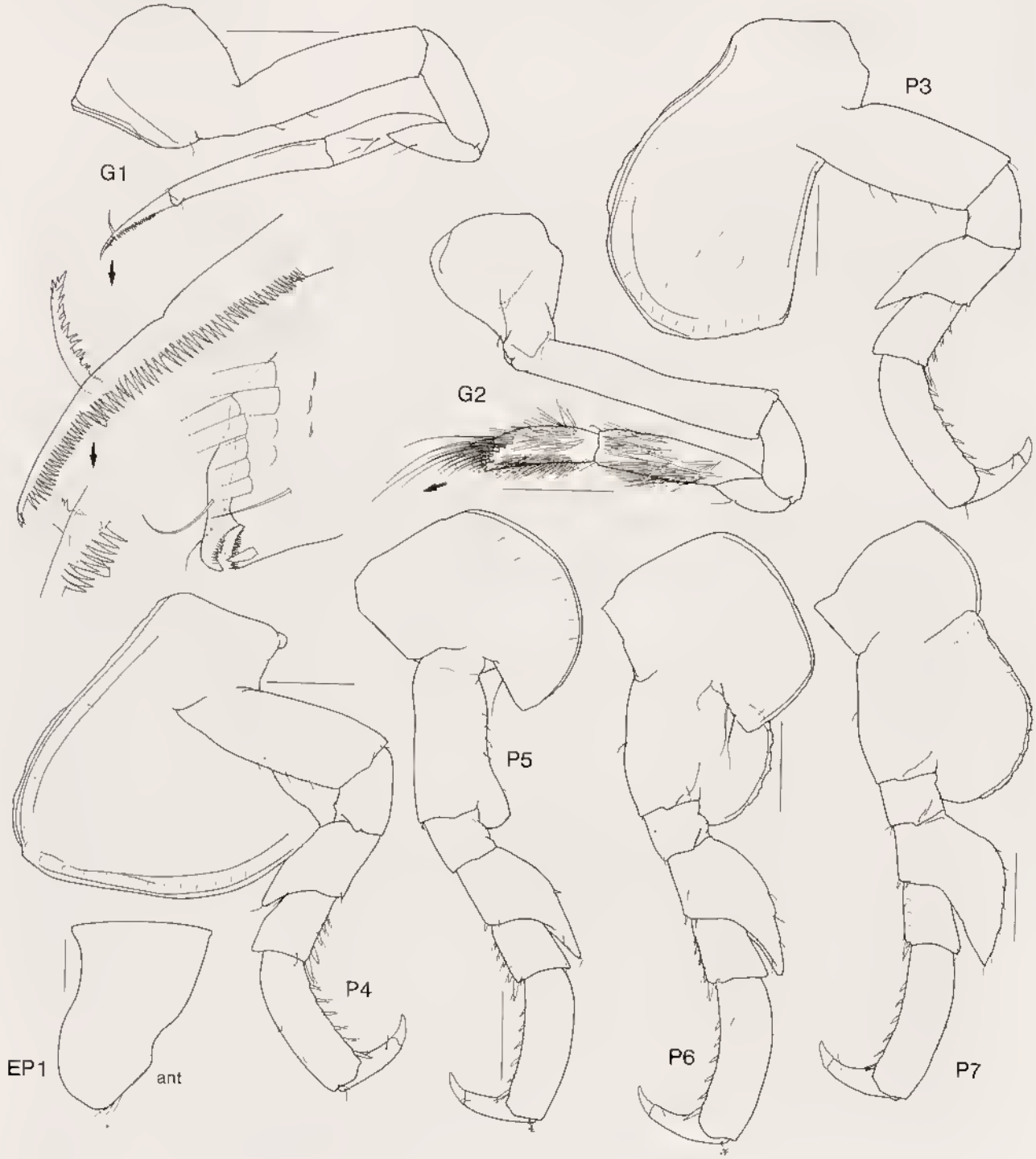

FIG. 29. — *Lepidepecreella sarcelle* sp. nov., holotype, sex not known, 3+ mm (MNHN-Am 4383), north of the Isle of Pines, New Caledonia. Scales represent 0.2 mm.

Source : MNHN, Paris

Peraeopod 6 : coxa small, strongly lobate posteriorly; basis expanded posteriorly with smooth posterior margin, without anteroventral lobe; merus expanded, posterior margin rounded, produced distally along carpus; propodus with 5 spines along anterior margin and 2 distal spines; dactylus long, stocky. *Peraeopod 7* : basis expanded posteriorly, posterior margin almost straight, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus broadly expanded with rounded posteroproximal shoulder and straight posterior margin, produced posterodistally beyond carpus; propodus with 5 spines and 2 distal spines along anterior margin, and 2 setae along posterior margin; dactylus long, stocky.

Gills : from gnathopod 2 to peraeopod 7, not pleated. *Pleonites*, *Urosomites* and *Telson* unknown.

ETYMOLOGY. — Named for the Sarcelle Passage between New Caledonia and the Isle of Pines.

REMARKS. — As J.L. BARNARD (1966) stated, *Lepidepecreella bidens* is the species most distinct from the type species, *L. ctenophora* because of the posteroventral lobe on the basis of peraeopod 5. *Lepidepecreella sarcelle* also has a posteroventral lobe and comes from the same geographic area as *L. bidens*. It is unfortunate that the urosome is missing because it is extremely distinctive in this genus. Nonetheless *L. sarcelle* differs from *L. bidens* as follows : the dactylus of gnathopod 1 does not have an excavate, convex posterior margin; the carpus and propodus of gnathopod 2 are not as long and linear and the palm is slightly obtuse and convex, not concave; the posteroventral lobe on the basis of peraeopod 5 is poorly developed and does not extend past the ischium.

DISTRIBUTION. — *Lepidepecreella sarcelle* is known from southern New Caledonia, in 825 to 860 m depth.

Genus *ONESIMOIDES* Stebbing, 1888

Onesimoides abyssalis sp. nov.

Figs 30-32

MATERIAL EXAMINED. — **Loyalty Islands**. BIOCAL : stn CP 17, 20°34.54'S, 167°24.68'E to 20°34.62'S, 167°25.46'E, north-east of Lifou, 3680 m, 14 August 1985 : 1 ♀, 13.2 mm (MNHN-Am 4426); 1 ♂, 11.5 mm (MNHN-Am 4784); 64 specimens (MNHN-Am 4461); 10 specimens (AM P42140). — Stn CP 72, 22°09.02'S, 167°33.18'E to 22°10.65'S, 167°33.78'E, north-east of Cape Coronation, Loyalty Islands Basin, 2100-2110 m, 4 August 1985 : 1 ♀ (MNHN-Am 4460).

TYPES. — The female (MNHN-Am 4426) is the holotype. The other specimens are paratypes.

TYPE LOCALITY. — North-east of Lifou, Loyalty Islands, 20°34.54'S, 167°24.68'E to 20°34.54'S, 167°24.68'E, 3680 m.

DIAGNOSIS. — Antennae : calceoli present in adult male. Gnathopod 1 : in male with large setal patch on merus and propodus, palm changing with age from transverse to a midpalmar tooth and posterior cavity. Pleonite 3 without dorsal carina. Urosomite 1 without lateral flange. Epimeron 3 ; posteroventral corner narrowly rounded. Uropod 3 : inner ramus about 0.6 times outer ramus.

DESCRIPTION. — Based on holotype female, 13.2 mm, MNHN-Am 4426; paratype male, 11.5 mm, MNHN-Am 4784. *Head* : exposed, deeper than long; lateral cephalic lobe large, broadly rounded; rostrum absent; eyes apparently absent. *Antenna 1* : medium length; peduncular article 1 short, length about 1.2 times breadth; peduncular article 2 short, 0.38 times article 1; peduncular article 3 long, 0.34 times article 1; accessory flagellum medium length, 0.47 times primary flagellum, 4-articulate, article 1 long, 8.5 times article 2 (male long, 7.6 times article 2), forming cap covering callynophore; flagellum 16-articulate (male 14), with strong 2-field callynophore in female and male, without flagellar spines, calceoli absent (present in adult male, 2). *Antenna 2* : slightly longer than antenna 1 (same in male); peduncle without brush setae (same in male), weakly geniculate between peduncular articles 3-4, article 3 short, 0.40 times article 4 (male weakly geniculate between peduncular

Source : MNHN, Paris

articles 3-4, article 3 short, 0.3 times article 4), peduncular articles 4 and 5 not enlarged in male or female; flagellum well developed, 16-articulate (male 12), without thick setal brush, calceoli absent in female (4 present in adult male).

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate; epistome slightly convex; upper lip slightly produced, rounded. *Mandible* : incisors symmetrical, small, with slightly convex margins; left lacinia

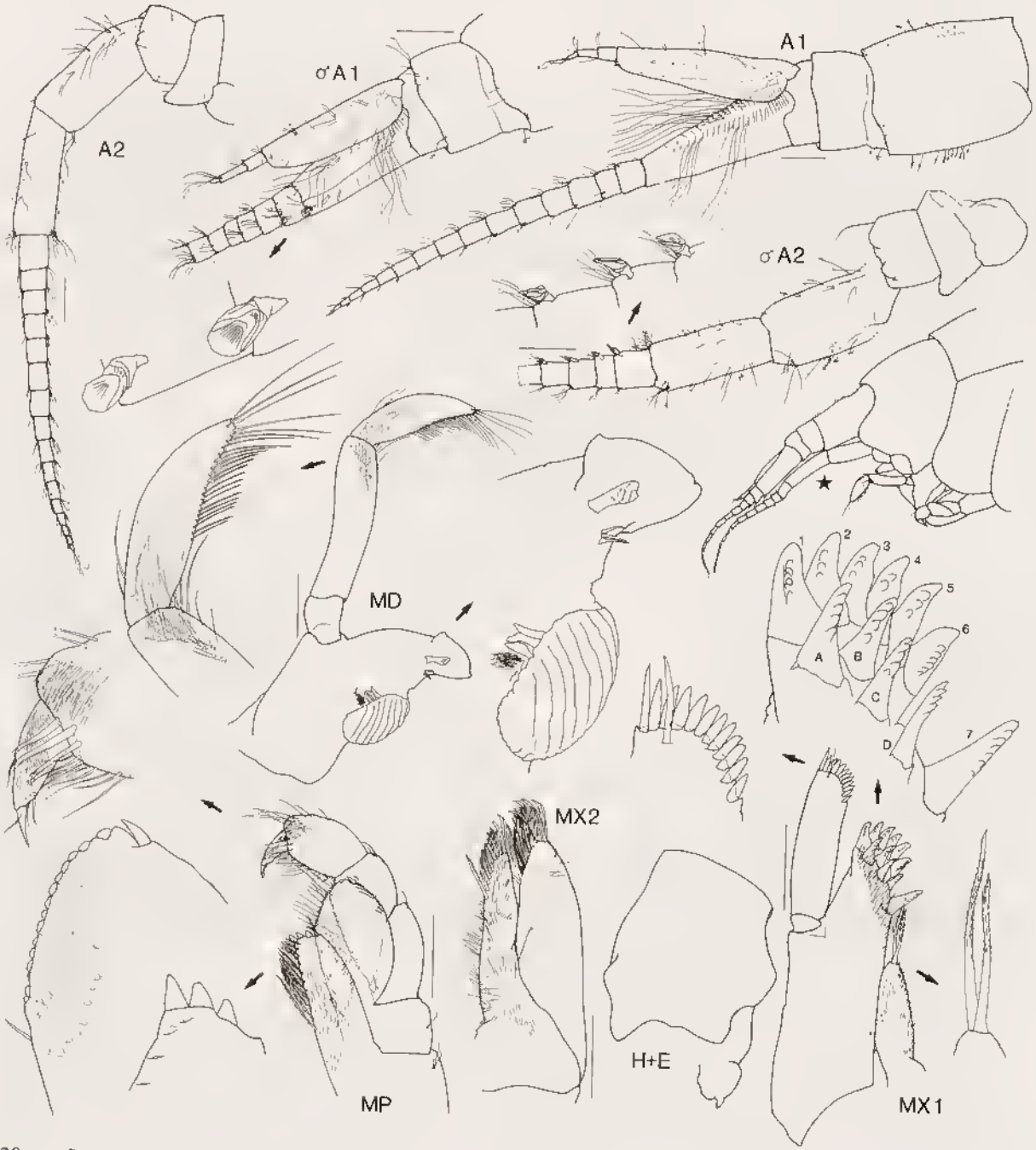

FIG. 30. — *Onesimoides abyssalis* sp. nov., holotype female, 13.2 mm (MNHN-Am 4426); paratype male, 11.5 mm (MNHN-Am 4461); female, 11.5 mm (MNHN-Am 4461); north-east of Lifou, Loyalty Islands. Scales represent 0.2 mm.

Source : MNHN, Paris

mobilis present, a cuspidate peg; accessory spine row without distal setal tuft, left and right row each with 3 short, thin, simple spines, without intermediate setae; molar with reduced column and convex triturating surface; mandibular palp attached midway; article 1 short, length 1.1 times breadth; article 2 slender, length 4.1 times breadth, 1.3 times article 3, with 20 submarginal posterodistal A2-setae (male 14), without B2-setae or D2-setae; article 3 falcate, long, length 3.4 times breadth, with 2 (male 2) proximal A3-setae, without B3-setae, with 19 (male 21) D3-setae along most of posterior margin and 3 apical E3-setae. *Maxilla 1* : inner plate narrow with 2 plumose apical setae, outer seta without denticulate row; outer plate with 11 spine-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, multicuspidate, ST4 large, stout, 2-cuspidate, ST5 large, stout, 3-cuspidate, ST6 large, stout, 6-cuspidate, ST7 slightly displaced from ST6, large, broad, 6-cuspidate; inner row with STA large, slightly displaced from STB-STD, 4-cuspidate, STB-STC large, broad, 4-cuspidate, STD long, slender, 4-cuspidate; palp large, 2-articulate, with 11 long terminal spines, with 1 subterminal seta, flag spine present on distolateral corner, distomedial margin smooth. *Maxilla 2* : inner plate narrow, outer plate broader, inner plate 1 times length outer plate. *Maxilliped* : inner plate very large, subrectangular, with 3 apical nodular spines, with 1 distal spine on lateral face near inner margin, oblique setal row strong with 11 plumose setae; outer plate small, subovate, without subapical notch, with many fine apical setae, with 1 apical spine, medial spines present, small, submarginal setae long, simple; palp large, 4-articulate; article 2 broad, length 1.6 times breadth, 1.3 times article 3; article 3 short, broad, length 1.5 times breadth; dactylus well developed, with 4 subterminal setae, unguis present.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : sexually dimorphic; female, chelate; coxa reduced, anterior margin slightly concave, anteroventral corner rounded, posterior margin slightly concave; basis long, slender, length 3 times breadth, anterior margin smooth, with simple setae; ischium long, length 1.8 times breadth; merus, posterior margin lined with long simple setae; carpus subtriangular, short, length 1.5 times breadth, shorter than (0.7 times) propodus, without denticulate patch near posterodistal margin; propodus large, subrectangular, length 1.9 times breadth, margins subparallel, posterior margin smooth, strongly sinusoidal, with 7 groups of setae, without denticulate patch near posterior margin, palm obtuse, margin convex, smooth, posterodistal corner with 1 medial and 1 lateral spines; dactylus simple, with subterminal tooth. Gnathopod 1 in male, subchelate; basis long, slender, length 3.1 times breadth; merus with large brush of setae on medial face; carpus subtriangular, short, length 1.2 times breadth, shorter than (0.61 times) propodus; propodus massive, subrectangular, length 1.6 times breadth, slightly tapering distally, posterior margin smooth, convex, with dense brush of setae on medial face, palm transverse anteriorly and posteriorly with large vertical step medially, smooth, posterodistal corner with 1 medial and 1 lateral spines; dactylus simple, without subterminal teeth or spines. *Gnathopod 2* : minutely chelate; coxa intermediate in size between coxa 1 and coxa 3; ischium long, length 2.4 times breadth; carpus long, length 2.6 times breadth, posterior margin broadly lobate; propodus subquadrate, short, length 1.3 times breadth, posterior margin without strong distal spines, palm obtuse, with straight, serrate margin, posterodistal corner with 1 (male 1) medial spine; dactylus reaching corner of palm, posterior margin rugose.

Peraeopod 3 : coxa large; merus weakly expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 8 spines and 2 distal spines along posterior margin; dactylus short, stocky. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus weakly expanded anteriorly, male and female merus-carpus without plumose setae; propodus with 9 spines and 2 distal spines along posterior margin; dactylus short, stocky. *Peraeopod 5* : coxa equilobate; basis expanded with posterior margin minutely crenate; merus expanded with rounded posterior margin; propodus with 6 setae and 2 distal spines along anterior margin; dactylus short, stocky. *Peraeopod 6* : coxa small, slightly lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin, basis and ischium with anteroventral lobe; merus expanded with rounded posterior margin; propodus with 6 setae and 2 distal spines along anterior margin; dactylus short, stocky. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus expanded posterodistally with straight posterior margin; propodus with 5 spines and 2 distal spines along anterior margin and 2 setae and 4 distal setae along posterior margin; dactylus short, stocky.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* : from gnathopod 2 to peraeopod 6, not pleated.

Source : MNHN, Paris

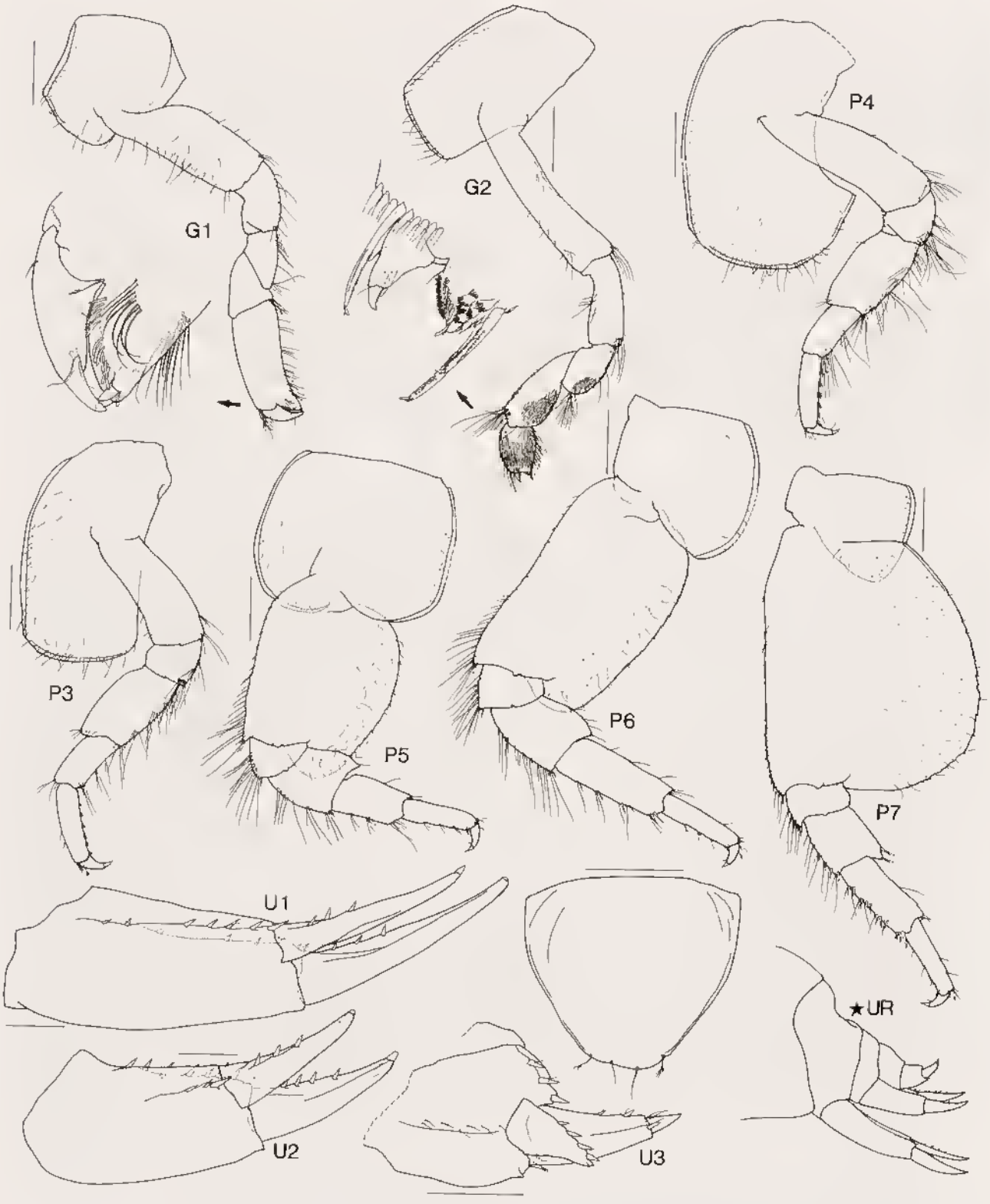

FIG. 31. — *Onesimoides abyssalis* sp. nov., holotype female, 13.2 mm (MNHN-Am 4426); female, 11.5 mm (MNHN-Am 4461); north-east of Lifou, Loyalty Islands. Scales for U1-3, T represent 0.2 mm, remainder represent 0.5 mm.

Source : MNHN, Par

Pleonite 3 dorsally smooth, without dorsal carina. *Epimeron 1* : anteroventral corner rounded. *Epimeron 3* : posteroventral corner narrowly rounded. *Urosomites* : urosomite 1 with anterodorsal notch and low rounded boss, without dorsal carina, without lateral flange; urosomite 3 without small dorsolateral spine. *Uropod 1* : peduncle with 3 dorsolateral, 1 apicolateral, 6 dorsomedial and 1 apicomedial spines; outer ramus slightly longer than inner ramus, outer ramus with 3 dorsal spines; inner ramus with 3 dorsal spines. *Uropod 2* : peduncle without dorsolateral flange, with 7 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial spines; rami subequal in length, outer ramus with 4 dorsal spines; inner ramus with 3 dorsal spines, without constriction. *Uropod 3* : peduncle well developed, short, length 1.2 times breadth, with dorsolateral flange, with 2 dorsolateral and 1 apicolateral spines, with 7 midlateral setae and 2 distoventral spines; biramous, rami lanceolate, inner ramus reduced, about 0.6 times outer ramus, outer ramus 2-articulate, article 2 short, article 1 with 2 lateral and 1 medial spines; inner ramus with 4 lateral spines, plumose setae absent in female (absent in male). *Telson* : shorter than broad, length 0.9 times breadth, entire, without dorsal spines or dorsal setae, distal margin rounded, with 2 marginal penicillate setae and 2 simple marginal setae, without marginal spines.

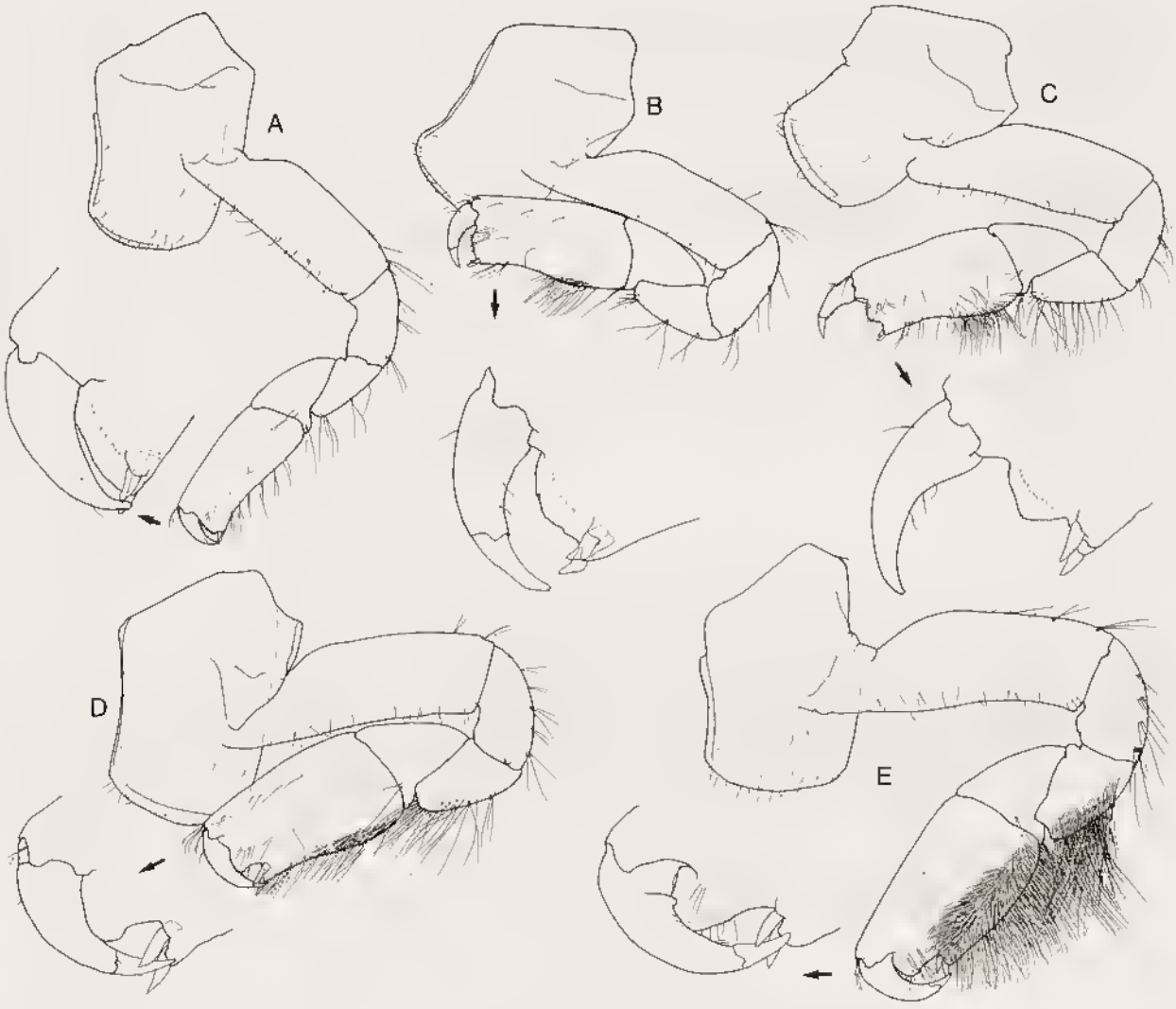

FIG. 32. — *Onesimoides abyssalis* sp. nov., **A**. paratype male, 7.0 mm; **B**. paratype male, 8.2 mm; **C**. paratype male, 8.8 mm; **D**. paratype male, 9.5 mm; **E**. paratype male, 11.5 mm (MNHN-Am 4461); north-east of Lifou, Loyalty Islands.

Source : MNHN, Paris

ETYMOLOGY. — The specific name refers to the depth at which this species lives.

REMARKS. — *Onesimoides abyssalis* differs from *O. carinatus* Stebbing, 1888, in having calceoli in the male; although the shape of the palm of gnathopod 1 is similar in the male, the propodus is longer and not as wide; there is no carina on pleonite 3; and no lateral flange on urosomite 3. *Onesimoides abyssalis* is easily distinguished from *O. castellatus* Lowry & Stoddart, 1993, because of the strong patch of setae on the merus and propodus of the male gnathopod 1 and the very different shape of the palm. *Onesimoides abyssalis* is most similar to *O. mindoro* Lowry & Stoddart, 1993, but the shape of the palm and the length to width ratios of the propodus of male gnathopod 1 are different.

DISTRIBUTION. — *Onesimoides abyssalis* is known from the Loyalty Basin, in 3680 m depth.

Onesimoides carinatus Stebbing, 1888

Onesimoides carinatus Stebbing, 1888 : 648, pl. 14; 1906 : 32, fig. 8. — DELLA VALLE, 1893 : 796, pl. 60, figs 39-41. — THURSTON & ALLEN, 1969 : 363. — LOWRY & STODDART, 1993 : 77, figs 13-16.
Onesimoides cavimanus Pirlot, 1933 : 129, figs 40-41.
not *Onesimoides cavimanus* - DAHL, 1959 : 214, fig. 3 (= *O. mindoro*).
not *Onesimoides cavimanus* - LEDOYER, 1978 : 375, figs 9-10b; 1986 : 794, fig. 309 (= *Onesimoides* sp.).

MATERIAL EXAMINED. — **Wallis and Futuna Islands.** MUSORSTOM 7 : stn DW 637, 13°37'S, 179°56'W, south-west of Rotumah Bank, South Pacific Ocean, inside a hollowed out piece of wood in narrow cavities and chambers, mouthparts covered with mushy wood, 820-830 m, 30 May 1992 : 1 ♂, 1 ♀, 2 juveniles (MNHN-Am 4785); 1 ♂, 1 juvenile (AM P42141).

REMARKS. — LOWRY & STODDART (1993) have recently redescribed *Onesimoides carinatus* and compared it with related species. In these specimens the dorsal carina on pleonite 3 and urosomite 1 is present but very weak. This record extends the genus *Onesimoides* onto the Pacific plate.

DISTRIBUTION. — Indonesia (1158 m); Coral Sea (900 to 2560 m); Rotumah Bank, near Wallis and Futuna Islands (820 to 830 m).

Genus *ORCHOMENELLA* Sars, 1890

REMARKS. — DE BROYER (1984; 1985) has tentatively revised the generic concepts in the *Orchomenella* complex. However, we cannot confidently place the species in our collection into available genera or subgenera based on present diagnoses. The three species all have the gnathopod 1 carpal lobe of *Orchomenopsis* Sars, 1891, and *Abyssorchomene* De Broyer, 1984; *O. gerulicorbis* (Shulenberger & Barnard, 1976) has a subcylindrical molar with oval triturating surface without setae (= *Orchomenopsis*); *O. distinctus* Birstein & Vinogradov, 1960, has a molar in the shape of a crest, as in *Abyssorchomene*, but without setae on the triturating surface; *O. abyssorum* (Stebbing, 1888) also has a molar without setae on the triturating surface but it is gradational in shape between that of *Abyssorchomene* and *Orchomenopsis*. Therefore we tentatively place these species into the broadly defined genus *Orchomenella* until the complete revision of DE BROYER is available.

Orchomenella abyssorum (Stebbing, 1888)

Orchomene abyssorum Stebbing, 1888 : 676, pl. 21. — LOWRY & BULLOCK, 1976 : 94. — BARNARD & KARAMAN, 1991 : 508.
Orchomenopsis abyssorum - SARS, 1891 : 74. — CHEVREUX, 1900 : 23; 1903 : 92; 1905b : 7; 1935 : 59. — WALKER, 1903 : 232. — STEBBING, 1906 : 84, fig. 14. — STEPHENSEN, 1925 : 125. — DAHL, 1954 : 282.
Anonyx abyssorum - DELLA VALLE, 1893 : 824.

Source : MNHN, Par

Orchomenella abyssorum - RUFFO, 1949 : 10 (list). — SCHELLENBERG, 1955 : 192. — J.L. BARNARD, 1958 : 96; 1964b : 86, 89 (key). — DAHL, 1959 : 225. — BIRSTEIN & VINOGRADOV, 1960 : 188, fig. 8; 1962 : 41; 1964 : 164. — GURJANOVA, 1962 : 433 (key). — HURLEY, 1963 : 125, 126. — THURSTON & ALLEN, 1969 : 364. — SANDERSON, 1973 : 37. — ARNAUD, 1974 : 572.
Orchomenopsis (Orchomene) abyssorum - COSTELLO *et al.*, 1989 : 32.
Orchomene (Abyssorchomene) abyssorum - BARNARD & INGRAM, 1990 : 26, figs 15-17.
Abyssorchomene abyssorum - THURSTON, 1990 : 262, 263. — PALERUD & VADER, 1991 : 32.
? *Orchomenella abyssorum* - K.H. BARNARD, 1932 : 69, figs 27b, 28. — NICHOLLS, 1938 : 35, fig. 15. — LOWRY, 1982 : 320.
? *Orchomene abyssorum* - AUSTIN, 1985 : 601.
not *Orchomenopsis chilensis abyssorum* Schellenberg, 1926a : 291, fig. 27 (= *Orchomenella* sp.).

MATERIAL EXAMINED. — **Marquesas Islands.** SMCB, R.V. *Marara* : stn 293, 9°47.30'S, 139°11.80'W, off Hiva-Oa Island, baited trap at 900 m, J.M. POUPIN, 30 August 1990 : 1 ♂, 7.0 mm (AM P42142).

REMARKS. — The specimen from the Marquesas differs from STEBBING's illustrations in the following points : the palp of maxilla 1 has 5 apical spines; the inner of the two apical spines on the maxilliped outer plate is broader; articles 2 and 3 of the maxillipedal palp are slightly broader; there are a few setae on the anterior margin of gnathopod 1 basis; the dorsal boss on urosomite 1 is slightly longer; uropod 1 inner ramus has a small spine on the medial margin; uropod 2 outer ramus has fewer spines; the proximal spine of the three dorsal spines on each lobe of the telson is very weak.

DISTRIBUTION. — *Orchomenella abyssorum* is known from off Buenos Aires, South Atlantic Ocean (3475 m); north-eastern North Atlantic Ocean (1414 to 4849 m); Kermadec Trench (8210 to 8300 m), Marquesas Islands (900 m), South Pacific Ocean; Galápagos vents, East Pacific Ocean (2491 m); Southern Ocean (210 to 3700 m).

Orchomenella distinctus Birstein & Vinogradov, 1960

Orchomenella distinctus Birstein & Vinogradov, 1960 : 191, fig. 10.
Orchomene (Abyssorchomene) distinctus - BARNARD & INGRAM, 1990 : 22, figs 12-14. — VINOGRADOV, 1993 : 43.
Abyssorchomene ?distincta - THURSTON, 1990 : 263.
Orchomene distinctus - BARNARD & KARAMAN, 1991 : 508.

MATERIAL EXAMINED. — **Loyalty Islands.** BIOGEOCAL : stn CP 225, 22°44.94'S, 166°19.84'E, Loyalty Islands Basin, 2200-2280 m, 11 April 1987 : 1 ♀, 18 mm (MNHN-Am 4466).

REMARKS. — There are no dorsal spines on the telson of this specimen; BIRSTEIN & VINOGRADOV (1960) show one pair of spines, and BARNARD & INGRAM (1990) show two pairs.

DISTRIBUTION. — *Orchomenella distinctus* is known from near Palau, south-western North Pacific Ocean (0 to 2000 m); East Pacific vent region, south-eastern North Pacific Ocean (2635 m); East Pacific vent region west of Sala y Gómez, south-eastern South Pacific Ocean (2024 to 2038 m); Loyalty Islands Basin, south-western Pacific Ocean (2200 to 2280); tropical Atlantic Ocean (2300 to 4942 m).

Orchomenella gerulicorbis (Shulenberger & Barnard, 1976)

Orchomene affinis - BIRSTEIN & VINOGRADOV, 1955 : 223, fig. 9.
Orchomene gerulicorbis Shulenberger & Barnard, 1976 : 243, figs 1-3. — THURSTON, 1979 : 56. — BARNARD & KARAMAN, 1991 : 508.
Orchomenella gerulicorbis - THURSTON, 1990 : 265.
Orchomenella (Orchomenopsis) gerulicorbis - PALERUD & VADER, 1991 : 41.

MATERIAL EXAMINED. — **Austral Istes.** SMCB, R.V. *Marara* , (J.K. LOWRY & J.M. POUPIN coll.) : stn FRP-55, 27°35.3'S, 144°15.5'W, just off Rapa, baited trap in 870 m, 17-18 August 1991 : 22 specimens (AM P42143). — Stn FRP-64, 27°35.5'S, 144°15.8'W, just off Rapa, large baited trap, 750 m, 18-19 August 1991 : 10 specimens

Source : MNHN, Paris

(MNHN-Am 4786) : 48 specimens (AM P42144). — Stn FRP-66, 27°35. 5'S 144° 15.8'W, just off Rapa, small baited trap, 750 m, 18-19 August 1991 : 4 specimens (AM P42145).

DISTRIBUTION. — *Orchomenella gerulicorbis* is known from the Austral Isles, South Pacific Ocean (750 to 879 m); North Pacific gyre (5720 m); off Kuril-Kamchatka, tropical and north-west Pacific Ocean; north-east Atlantic Ocean (3610 to 5940 m).

Genus *PARAMBASIA* Walker & Scott, 1903

Parambasia acuticaudata Ledoyer, 1984

Parambasia acuticaudata Ledoyer, 1984 : 84, fig. 41.

MATERIAL EXAMINED. — **Austral Isles.** SMCB, R.V. *Marara*, (J.K. LOWRY coll.) : stn FRP-16, 22°28.5'S, 151°21.38'W, lagoon in front of Puatai Rock, Avera, Rurutu, sand and algae with mussels on shallow reef platform near edge of reef, 0.5 m, 10 August 1991 : 1 ♀ (ovigerous, 4 eggs), 3 specimens (AM P42146). — Stn FRP-18, 22°28.5'S, 151°21.38'W, lagoon in front of Puatai Rock, Avera, Rurutu, *Sargassum*-like brown alga, extremely common just inside the reef platform, 1 m, 10 August, 1991 : 3 specimens (MNHN-Am 4787).

REMARKS. — These specimens are difficult to identify. They are not *P. nui* Myers, 1985, because article 2 of the mandibular palp is longer and more slender, article 3 of the maxillipedal palp is not short and broad, the palm of gnathopod 1 is not as well defined and although the inner ramus of uropod 3 is shortened, it is not as short as that of *P. nui*. Examination of the type material of *P. nui* indicates that both male and female have a similar gnathopod 1 and both look like the male figured by MYERS, 1985. The ovigerous female has no oostegiles, but the situation in LEDOYER's female material of *P. acuticaudata* is undetermined. We can see no differences between these specimens and the specimen described by LEDOYER (1984). Aside from the slightly shortened inner ramus of uropod 3 the Austral Isle material fits best to *P. acuticaudata*.

DISTRIBUTION. — New Caledonia and Austral Isles, in less than 10 m depth.

Genus *PROCYPHOCARIS* J.L. Barnard, 1969

Procyphocaris indurata (K.H. Barnard, 1925)

Uristes induratus K.H. Barnard, 1925 : 333 pl. 34, fig. 3.
Procyphocaris primata J.L. Barnard, 1961 : 49, fig. 18.
Procyphocaris induratus - GRIFFITHS, 1975 : 149. — LEDOYER, 1986 : 800, fig. 312.
Procyphocaris indurata - BARNARD & KARAMAN, 1991 : 520.

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn CP 57, 23°44.51'S, 166°54.94'E to 23°56.52'S, 166°40.55'E, south of the Isle of Pines, 1490-1620 m, 1 September 1985 : 1 specimen (MNHN-Am 4433). — Stn CP 58, 23°56.52'S, 166°40.55'E to 23°55.86'S, 166°41°71'E, south of the Isle of Pines, 2660-2750 m, 2 September 1985 : 1 specimen (MNHN-Am 4435).

DISTRIBUTION. — *Procyphocaris indurata* is known from southern Africa, Australia and New Caledonia, in 1280 to 2750 m depth.

Genus *SOCARNES* Boeck, 1871

Socarnes Boeck, 1871 : 99. — STEBBING, 1906 : 56 (in part, not *Ephippiphora* White, 1847). — J.L. BARNARD, 1969 : 362. — LINCOLN, 1979 : 96 (in part, not *Socarnopsis* Chevreux, 1911). — BARNARD & KARAMAN, 1991 : 531.

Source : MNHN, Paris

DIAGNOSIS. — Upper lip produced beyond epistome in large rounded lobe. Mandible : lacinia mobilis present; molar setose with or without distal vestigial triturating surface. Maxilla 1 : ST7 symmetrical; palp terminally serrate. Gnathopod 1 : simple.

TYPE SPECIES. — *Lysianassa vahlii* Krøyer, 1838, by monotypy.

SPECIES COMPOSITION. — *Socarnes* contains 10 taxa : *S. bidenticulatus* (Bate, 1858); *S. bidenticulatus japonicus* Gurjanova, 1962; ? *S. eugenovi* (Gurjanova, 1934); *S. hartmani* Hurley, 1963; *S. rurutu* sp. nov.; *S. tiendi* sp. nov.; *S. tuscarora* sp. nov.; *S. illudens* (Hurley, 1963); ? *S. unidentatus* Schellenberg, 1931; *S. vahlii* (Krøyer, 1838).

HURLEY (1963), originally placed *S. illudens* in *Socarnoides* because it had an incised inner ramus on uropod 2 (we do not regard this as a generic character). He pointed out that in other respects it resembled *S. vahlii*. We are transferring *S. illudens* to *Socarnes* because of the shape of the epistome/upper lip complex, the midway insertion of the mandibular palp and the non-swollen base of the maxilla 1 palp.

Socarnoides eugenovi possibly belongs in *Socarnes*. It is currently not well enough described to place with certainty in any genus, but the upper lip/epistome complex is uncharacteristic of *Socarnoides* and similar to that of *Socarnes*. The base of the maxilla 1 palp is not swollen and the mandibular palp appears to be inserted more distally than in *Socarnoides*. *Socarnes unidentatus* has been placed in the genus *Socarnoides* (HURLEY, 1963; BARNARD & KARAMAN, 1991), again probably because of the incised inner ramus of uropod 2. The species is poorly described and illustrated, but based on the illustration of the epistome/upper lip it should not be considered as a *Socarnoides* and is more likely to be in the genus *Socarnes*.

BARNARD & KARAMAN (1991) assigned, with some doubt, *Orchomene morbihanensis* Bellan-Santini & Ledoyer, 1974, to the genus *Socarnes*. However, the species belongs in the genus *Lysianella* Sars, 1883. Among other *Lysianella* characters it has the characteristic swollen peduncular article 4 of antenna 2 and the short mandibular palp article 2.

REMARKS. — LINCOLN (1979) synonymized *Socarnes* and *Socarnopsis* Chevreux, 1911, because the type species of both genera have the gills pleated on both sides. We agree that these genera are closely related, but we think that consistent differences, such as the presence or absence of a lacinia mobilis, the triturating surface of the molar and the terminal ornamentation of the maxilla 1 palp, indicate that the genera should remain separate. All species attributed to these genera need to be carefully examined.

DISTRIBUTION. — *Socarnes* is known from north-eastern Atlantic ocean; north-western and south-western North Pacific Ocean; tropical south-western South Pacific Ocean; from immediate sublittoral to 550 m depth.

Socarnes rurutu sp. nov.

Figs 33-35

MATERIAL EXAMINED. — **Austral Isles.** SMCB, R.V. *Marara*, (J.K. LOWRY, & J.M. POUPIN coll.) : stn FRP-7, 21°47.7'S, 154°43.4'W, north-east side of Maria Island, baited trap, 500 m, 8 August 1991 : 6 specimens (MNHN-Am 4788). — Stn FRP-23, 22°29.3'S, 151°21.9'W, off Rurutu, baited trap on sandy bottom, 490 m, 10 August 1991 : 1 ♀?, 6.4 mm (AM P42147); 2 specimens (AM P42148). — Stn FRP-56, 27°36.2'S, 144°16.3'W, off Rapa, baited trap, 290 m, 7-18 August 1991 : 5 specimens (AM P42149).

TYPES. — The ?female, 6.4 mm (AM P42147) is the holotype. The other specimens are paratypes.

TYPE LOCALITY. — Off Rurutu, Austral Isles, French Polynesia, 22°29.3'S, 151°21.9'W, 490 m.

DIAGNOSIS. — Maxilla 1 : palp with vestigial terminal spines. Maxilliped : inner plate without nodular spines. Gnathopod 2 : minutely subchelate, palm extremely obtuse with straight margin. Peraeopod 7 : posteroventral corner of basis rounded. Telson moderately cleft, about 50%.

Source : MNHN, Paris

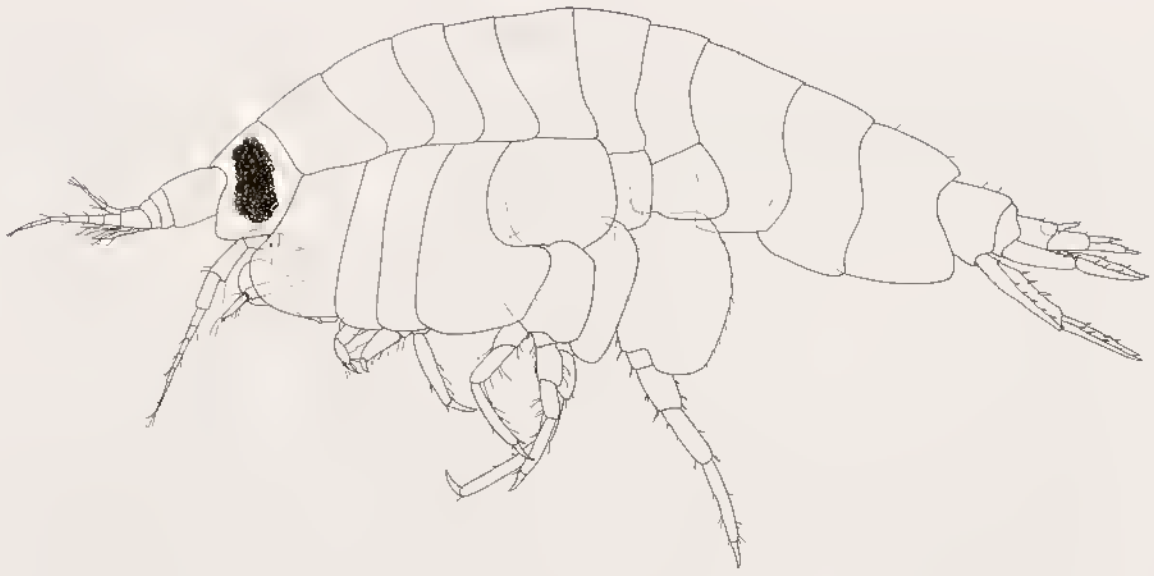

FIG. 33. — *Socarnes rurutu* sp. nov., paratype ?female, 5.8 mm (AM P42148), off Rurutu, Austral Isles, French Polynesia.

DESCRIPTION. — Based on holotype ?female, 6.4 mm; male not known. *Head* : exposed, deeper than long; lateral cephalic lobe large, broad, subacute; rostrum absent; eyes reniform. *Antenna 1* : medium length, 0.24 times body; peduncular article 1 short, length 1 times breadth, without tooth on distomedial margin, posterodistal tooth or anterodistal projection; peduncular article 2 short, 0.36 times article 1, without anterodistal projection; peduncular article 3 long, 0.23 times article 1; accessory flagellum long, 0.5 times primary flagellum, 5-articulate, article 1 long, 2 times article 2, not forming cap; flagellum 9-articulate, with strong 2-field callynophore without setae or spines, without flagellar spines, calceoli absent. *Antenna 2* : subequal in length to antenna 1; peduncle without brush setae, weakly geniculate between peduncular articles 3-4, article 3 short, 0.46 times article 4, peduncular articles 4 and 5 not enlarged; flagellum well developed, 10-articulate, calceoli absent.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate; epistome concave; upper lip produced, apically rounded. *Mandible* : incisors symmetrical, large, with strongly convex margins; left lacinia mobilis present, a long slender peg; accessory spine row without distal setal tuft, left and right rows each with 4 slender to stout serrate spines, without intermediate setae; molar a strongly setose tongue; mandibular palp attached proximally; article 1 short, length 1.3 times breadth; article 2 slender, length 4.1 times breadth, 1.8 times article 3, with 11 submarginal posterodistal A2-setae; article 3 falcate, long, length 3.4 times breadth, without proximal A3-setae, with 7 proximal and 4 distal D3-setae and 2 apical E3-setae. *Maxilla 1* : inner plate narrow with 2 plumose apical setae, outer seta without denticulate row; outer plate with 11 spine-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, multicuspidate, ST4 large, slender, 7-cuspidate, ST5-ST6 large, slender, 9-cuspidate, ST7 slightly displaced from ST6, large, broad, 9-cuspidate; inner row with STA large, broad, 4-cuspidate, STB large, broad, 6-cuspidate, STC large, broad, 5-cuspidate, STD small, slender, 4-cuspidate; palp large, 2-articulate, with 4 vestigial spines on serrate apical margin, without subterminal setae, flag spine present on distolateral corner (vestigial), distomedial margin serrate. *Maxilla 2* : inner plate narrow, outer plate broader, inner plate 0.73 times length outer plate. *Maxilliped* : inner plate large, subrectangular, without nodular spines (apparently fused), oblique setal row strong with 7 plumose setae; outer plate small, subovate, distomedial margin obliquely truncated and slightly concave, with subapical notch, without apical setae or spines, without medial spines, submarginal setae vestigial; palp large, 4-articulate; article 2 slender, length 3.3 times breadth, 1.6 times article 3; article 3 long, slender, length 2.3 times breadth; dactylus well developed, with 3 subterminal setae, unguis present.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : simple; coxa large, as long as coxa 2, anterior margin concave, anteroventral corner produced, rounded, posterior margin slightly concave; basis long, slender, length

Source : MNHN, Paris

3.6 times breadth, anterior margin smooth, with simple setae; ischium short, length 1.1 times breadth, anterior margin smooth; merus, posterior margin with group of long simple setae; carpus subtriangular, short, length 1.6 times breadth, shorter than (0.9 times) propodus, without denticulate patch near posterodistal margin; propodus large, subrectangular, length 2.4 times breadth, tapering distally, posterior margin smooth, straight, with11 spines, without disto-medial setae, without denticulate patch near posterior margin, palm absent; dactylus simple, without subterminal teeth or spines. *Gnathopod 2* : minutely chelate; coxa large, subequal in size to

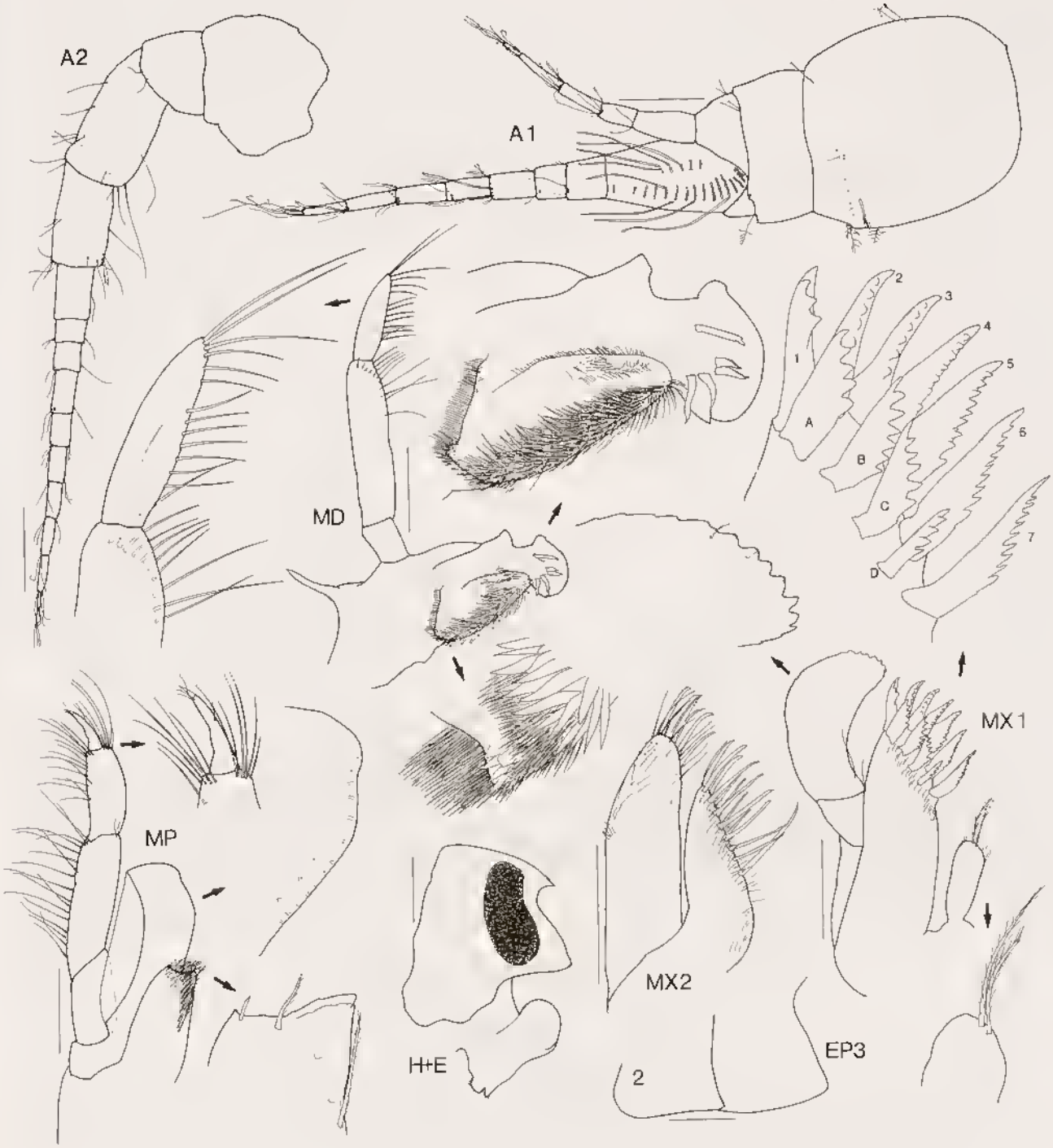

FIG. 34. — *Socarnes rurutu* sp. nov., holotype ?female, 6.4 mm (AM P42147), off Rurutu, Austral Isles, French Polynesia. Scales represent 0.2 mm.

Source : MNHN, Paris

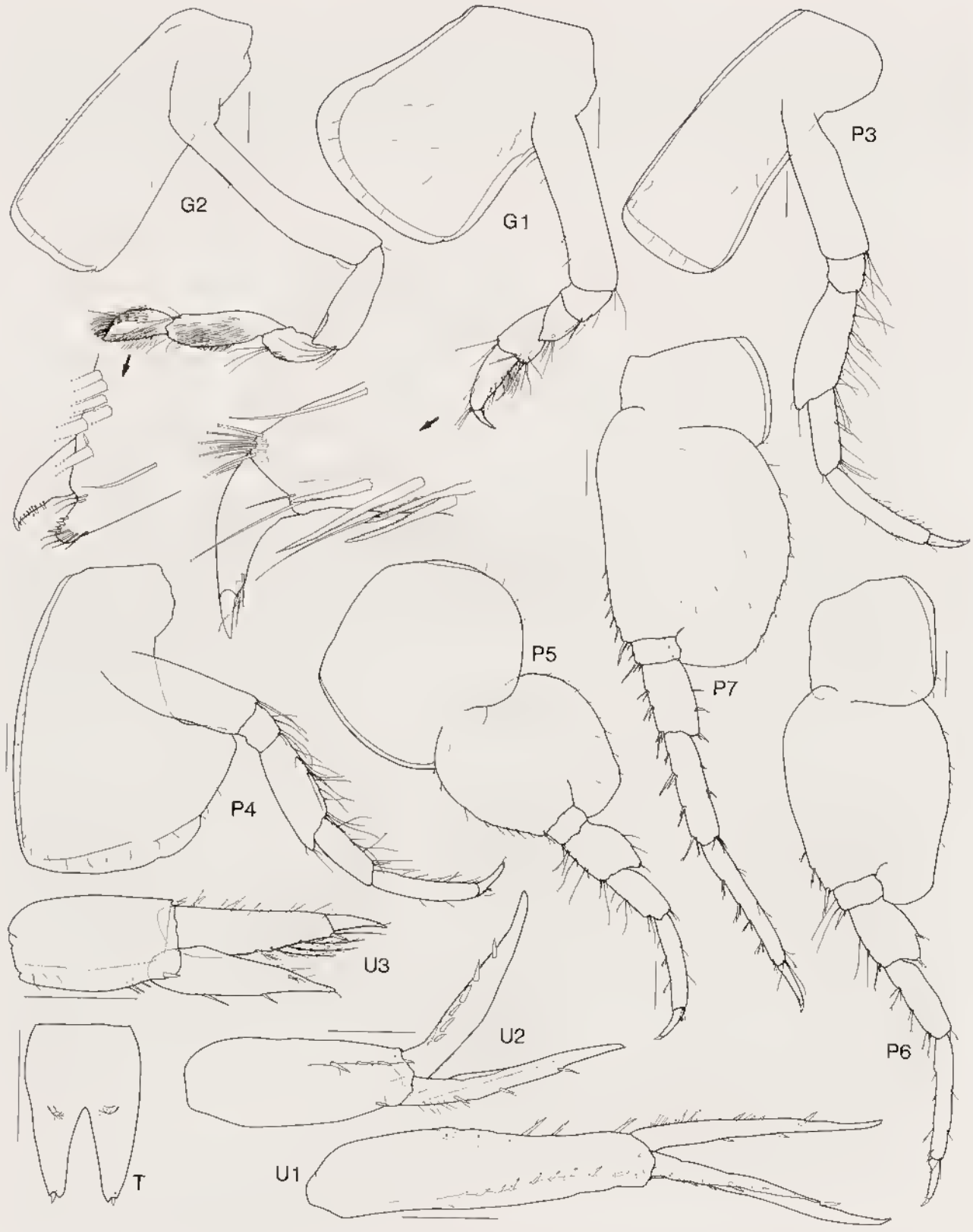

FIG. 35. — *Socarnes rurutu* sp. nov., holotype ?female, 6.4 mm (AM P42417), off Rurutu, Austral Isles, French Polynesia. Scales represent 0.2 mm.

Source : MNHN, Paris

coxa 3; ischium long, length 2.9 times breadth; carpus long, length 3.2 times breadth, posterior margin broadly lobate; propodus subrectangular, long, length 2.2 times breadth, palm extremely obtuse, with straight, smooth margin, posterodistal corner with 3 medial spines; dactylus over-reaching corner of palm, posterior margin smooth.

Peraeopod 3 : coxa large; merus expanded anterodistally along carpus, merus-carpus without plumose setae; propodus with 8 setae along posterior margin; dactylus short, slender. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus expanded anterodistally along carpus, merus-carpus without plumose setae; propodus with 9 setae along posterior margin; dactylus short, slender. *Peraeopod 5* : coxa equilobate (also very large); basis expanded with posterior margin minutely crenate; merus expanded with rounded posterior margin; propodus with 4 setae along anterior margin; dactylus short, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis, anterior margin rounded proximally, straight distally, basis expanded posteriorly with smooth posterior margin, without anteroventral lobe; merus expanded with rounded posterior margin; propodus with 4 setae and 1 distal spine along anterior margin; dactylus short, slender. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus not expanded posteriorly with 4 spines; propodus with 8 spines and 2 distal setae along anterior margin and 10 setae along posterior margin; dactylus short, slender.

Oostegites : [unknown]. *Gills* : from gnathopod 2 to peraeopod 6, with weak horizontal pleating.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner produced, narrowly rounded. *Epimeron 3* : posteroventral corner narrowly rounded. *Urosomites* : dorsally smooth; urosomite 3 with 1 small dorsolateral spine. *Uropod 1* : with long fine setae; peduncle with 10 dorsolateral, 1 apicolateral, 4 dorsomedial and 1 apicomedial spines; rami subequal in length, outer ramus with 7 lateral spines; inner ramus with 2 lateral and 2 medial spines. *Uropod 2* : with long fine setae; peduncle with 3 dorsolateral, 1 apicolateral and 1 apicomedial spines, without spines along distal margin; rami subequal in length, outer ramus with 6 lateral spines in weak acclivities; inner ramus with 3 lateral spines and weak constriction. *Uropod 3* : peduncle well developed, short, length 1.7 times breadth, without dorsolateral flange, with 1 apicolateral spine, without midlateral spines or setae, with 1 distoventral spine, without plumose setae; rami lanceolate, inner ramus reduced, about 0.84 times outer ramus, outer ramus 2-articulate, article 2 short, article 1 with 1 medial spine; inner ramus with 2 lateral and 1 medial spines, plumose setae present. *Telson* : longer than broad, length 1.5 times breadth, moderately cleft (52%), without dorsal spines or setae, distal margins incised, without marginal penicillate or simple setae, with 1 marginal spine on each lobe.

ETYMOLOGY. — Named for the island of Rurutu, near the type locality.

REMARKS. — *Socarnes rurutu* and *S. tuscarora* are the first records of the genus on the Pacific Plate. They are closely related species and the differences between them are complicated because no specimens of *S. rurutu* appear to be fully mature. Nonetheless *S. rurutu* differs from *S. tuscarora* and *S. tiendi*, from New Caledonia, in not having nodular spines on the inner plate of the maxilliped, having a rounded posteroventral corner on the basis of peraeopod 7, having stronger, though less numerous, spines on the rami of uropod 2 and having the telson cleft only about 50%. It differs further from *S. tiendi* in having an apically notched outer plate on the maxilliped and a minutely chelate gnathopod 2.

DISTRIBUTION. — *Socarnes rurutu* is known only from Rurutu, Austral Isles, in 290 to 500 m depth.

Socarnes tiendi sp. nov.

Figs 36-38

MATERIAL EXAMINED. — **New Caledonia.** LAGON : stn 394, 22°44'S, 167°06'E, east of Tiendi reef, Grand Récif Sud, 309 m, 23 January 1985 : 1 ♂, 12.5 mm (MNHN-Am 4386).

BIOCAL : stn DW 43, 22°46.21'S, 167°14.50'E to 22°46.22'S, 167°14.50'E, south of the Isle of Pines, 400 m, 30 August 1985 : 1 juvenile (MNHN-Am 4376).

Source : MNHN, Paris

MUSORSTOM 4 : stn DW 234, 22°15.50'S, 167°08.30'E, off the Havannah Channel, 350-365 m, 2 October 1985 : 1 ♀, 16.0 mm (MNHN-Am 4429).

TYPES. — The female (MNHN-Am 4429) is the holotype. The other specimens are paratypes.

TYPE LOCALITY. — East of Tiendi reef, Grand Récif Sud, New Caledonia, 22°15.50'S, 167°08.30'E, 350-365 m depth.

DIAGNOSIS. — Maxilla 1 : palp with vestigial terminal spines. Maxilliped : inner plate with nodular spines. Gnathopod 2 : subchelate, palm acute with large concave margin. Peraeopod 7 : posteroventral corner of basis subquadrate. Telson moderately cleft, about 60%.

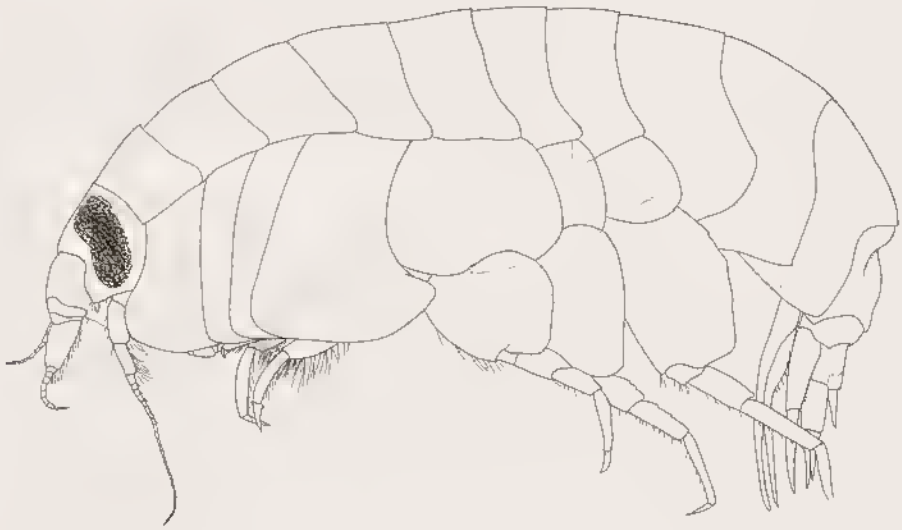

FIG. 36. — *Socarnes tiendi* sp. nov., holotype female 16 mm (MNHN-Am 4429), off Havannah Channel, New Caledonia.

DESCRIPTION. — Based on holotype female, 16.0 mm; male paratype, 12.5 mm. *Head* : exposed, deeper than long; lateral cephalic lobe large, broad, distally truncated (male slightly more acute); rostrum absent; eyes reniform, not enlarged in adult male. *Antenna 1* : short, 0.14 times body; peduncular article 1 short, length 1.1 times breadth, without dorsal crest, without tooth on distomedial margin, posterodistal tooth or anterodistal projection; peduncular article 2 short, 0.27 times article 1, without anterodistal projection; peduncular article 3 short, 0.15 times article 1; accessory flagellum long, 0.7 times primary flagellum, 11-articulate, article 1 short, 1.8 times article 2 (male short) not forming cap; flagellum 9-articulate (male 10+), with strong 2-field callynophore in female and male, without flagellar spines, calceoli absent in female and male. *Antenna 2* : length 1.7 times antenna 1 (0.7 times body length in male); peduncle without brush setae (same in male), female weakly geniculate between peduncular articles 3-4, article 3 short, 0.51 times article 4 (male strongly geniculate between peduncular articles 4-5, article 3 short, 0.52 times article 4), peduncular article 4 enlarged in male; flagellum well developed, 26-articulate (male 71), without thick setal brush, calceoti absent in female and male.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate; epistome concave; upper lip produced, apically rounded. *Mandible* : incisors symmetrical, large, with strongly convex margins; left lacinia mobilis present, a long slender peg; accessory spine row without distal setal tuft, left and right rows each with 4 long, slender, "bushy" spines, intermediate setae absent; molar a strongly setose tongue; mandibular palp attached proximally; article 1 long, length 2 times breadth; article 2 slender, length 4 times breadth, with 32 submarginal posterodistal A2-setae (male 22), without D2-setae; article 3 falcate, long, with 0 (male 1) proximal A3-setae, with 15+ (male 17) D3-setae along most of posterior margin and 2 apical E3-setae. *Maxilla 1* : inner plate narrow with 2 plumose apical setae, outer seta without denticulate row; outer plate with 11 spine-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, multicuspidate, ST4 large, slender, 10-cuspidate, ST5

Source : MNHN, Paris

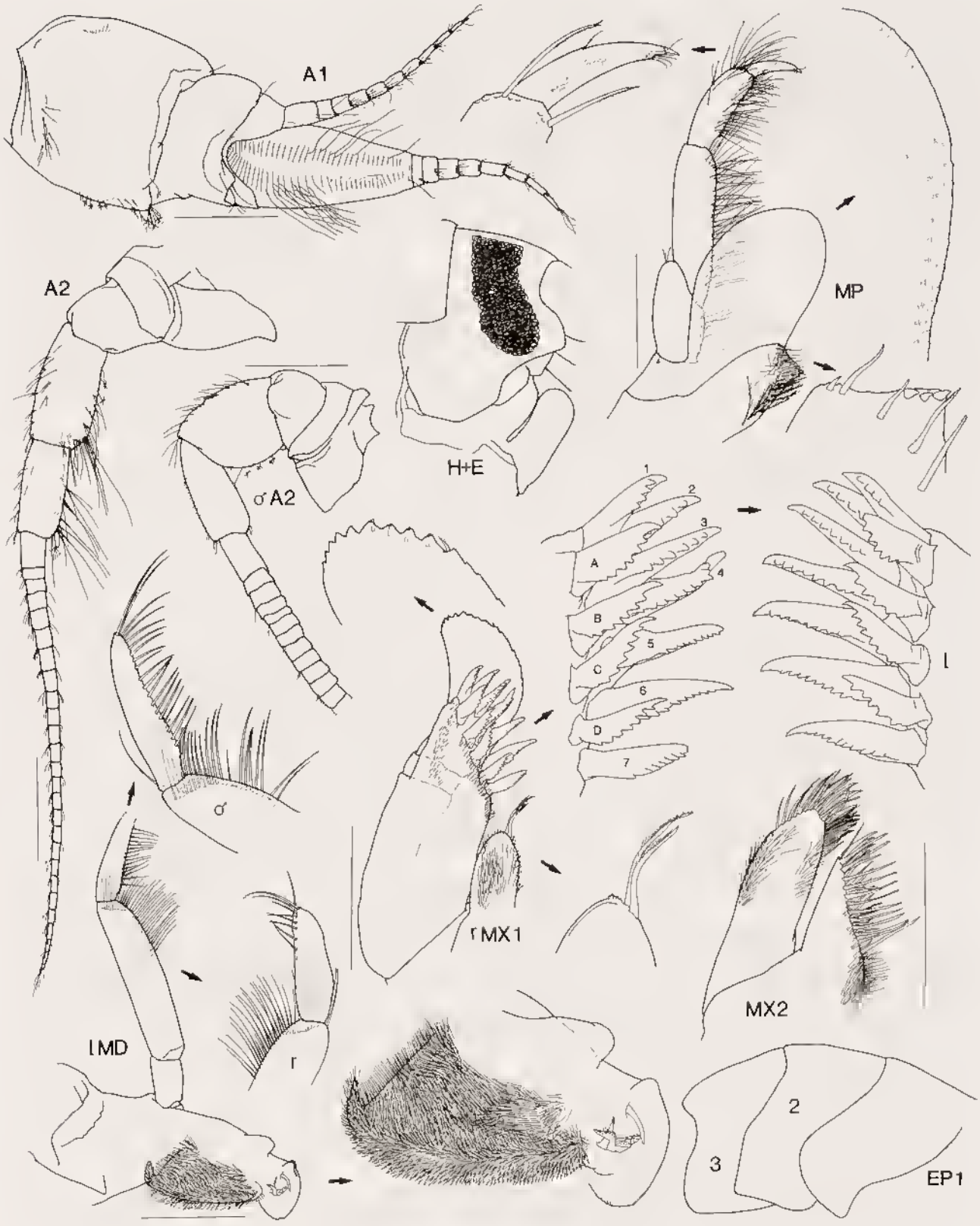

FIG. 37. — *Socarnes tiendi* sp. nov., holotype female, 16 mm (MNHN-Am 4429), off Havannah Channel, New Caledonia; paratype male, 12.5 mm (MNHN-Am 4386); Grand Récif Sud, east of Tiendi reef, New Caledonia. Scales represent 0.5 mm.

Source : MNHN, Paris

large, slender, 9-cuspidate, ST6 large, stout, multicuspidate, ST7 slightly displaced from ST6, large, broad, 8- to 10-cuspidate; inner row with STA large, broad, 6-cuspidate, STB large, broad, 5-cuspidate, STC large, broad, 7-cuspidate, STD large, broad, 6-cuspidate; palp large, 2-articulate, with 4-5 vestigial spines on serrate apical margin, without subterminal setae, flag spine present on distolateral corner (vestigial), distomedial margin serrate. *Maxilla 2* : inner plate narrow, outer plate broader, inner plate 0.73 times length outer plate. *Maxilliped* : inner plate large, subrectangular, with 3 apical nodular spines, oblique setal row strong with 14 plumose setae; outer plate small, subovate, without subapical notch, without apical setae, apical spines, apical teeth or medial spines, submarginal setae vestigial; palp large, 4-articulate; article 2 slender, length 3.7 times breadth, 1.6 times article 3; article 3 long, slender, length 2.9 times breadth; dactylus well developed, with 5 subterminal setae, unguis present.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : simple; coxa large, as long as coxa 2, anterior margin concave, anteroventral corner produced, rounded, posterior margin straight; basis long, slender, length 3.3 times breadth, anterior margin smooth, with simple setae; ischium short, length 1.2 times breadth, anterior margin smooth; merus, posterior margin with group of long simple setae and patch of short setae; carpus subtriangular, short, length 1.6 times breadth, longer than (1.1 times) propodus, without denticulate patch near posterodistal margin; propodus large, subrectangular, length 2.1 times breadth, tapering distally, posterior margin smooth, straight, with 13 spines, without disto-medial setae, without denticulate patch near posterior margin, palm absent; dactylus simple, without subterminal teeth or spines. *Gnathopod 2* : subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.3 times breadth; carpus long, length 2.6 times breadth, posterior margin broadly lobate; propodus subrectangular, short, length 1.7 times breadth, palm acute, with large, concave, smooth margin, posterodistal corner without spines; dactylus not reaching corner of palm, posterior margin serrate.

Peraeopod 3 : coxa large; merus expanded anterodistally along carpus, male and female merus-carpus without plumose setae; propodus with 10 setae and 2 distal spines along posterior margin; dactylus short, slender. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus expanded anterodistally along carpus, male and female merus-carpus without plumose setae; propodus with 9 setae and 2 distal setae along posterior margin; dactylus short, slender. *Peraeopod 5* : coxa equilobate (very large); basis expanded with posterior margin minutely crenate; merus expanded with rounded posterior margin; propodus with 12 spines and 2 distal spines along anterior margin; dactylus short, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis, anterior margin rounded proximally, straight distally, basis expanded posteriorly with minutely crenate posterior margin, without anteroventral lobe; merus expanded with rounded posterior margin; propodus with 10 spines and 2 distal spines along anterior margin; dactylus short, slender. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner subquadrate, posteroventral margin straight; merus not expanded posteriorly with 9 spines; propodus with 7 spines and 2 distal spines along anterior margin and 10 setae along posterior margin; dactylus long, slender.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* : from gnathopod 2 to peracopod 7, with strong horizontal pleating.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner produced, narrowly rounded. *Epimeron 3* : posteroventral corner narrowly rounded. *Urosomites* : urosomite 1 with anterodorsal notch, urosomite 3 without small dorsolateral spine. *Uropod 1* : with long fine setae; peduncle with 28 dorsolateral, 1 apicolateral, 26 dorsomedial and 1 apicomedial spines; rami subequal in length, outer ramus with 7 lateral and 7 medial spines; inner ramus with 16 lateral spines. *Uropod 2* : with long fine setae; peduncle with 8 dorsolateral and 2 dorsomedial spines, without spines along distal margin; rami subequal in length, outer ramus with 21 lateral spines in weak acclivities; inner ramus with 4 medial and 5.1 lateral spines and weak constriction. *Uropod 3* : peduncle well developed, long, length 2 times breadth, without dorsolateral flange, with 3 dorsolateral, 2 apicolateral and 1 apicomedial spines, with 12 midlateral spines and 1 distoventral spines, with plumose setae in female and male; rami lanceolate, inner ramus reduced, about 0.84 times outer ramus, outer ramus 2-articulate, article 1 short, article 1 with 1 medial spine; inner ramus without spines (male with 2 lateral spines), plumose setae present in female and male. *Telson* : longer than broad, length 1.6 times breadth, moderately cleft (60%), without dorsal spines, with row of 5 dorsal setae on each lobe, distal margins truncated, with 1 marginal penicillate seta and 1 simple marginal seta on each lobe, without submarginal spines.

Source : MNHN, Paris

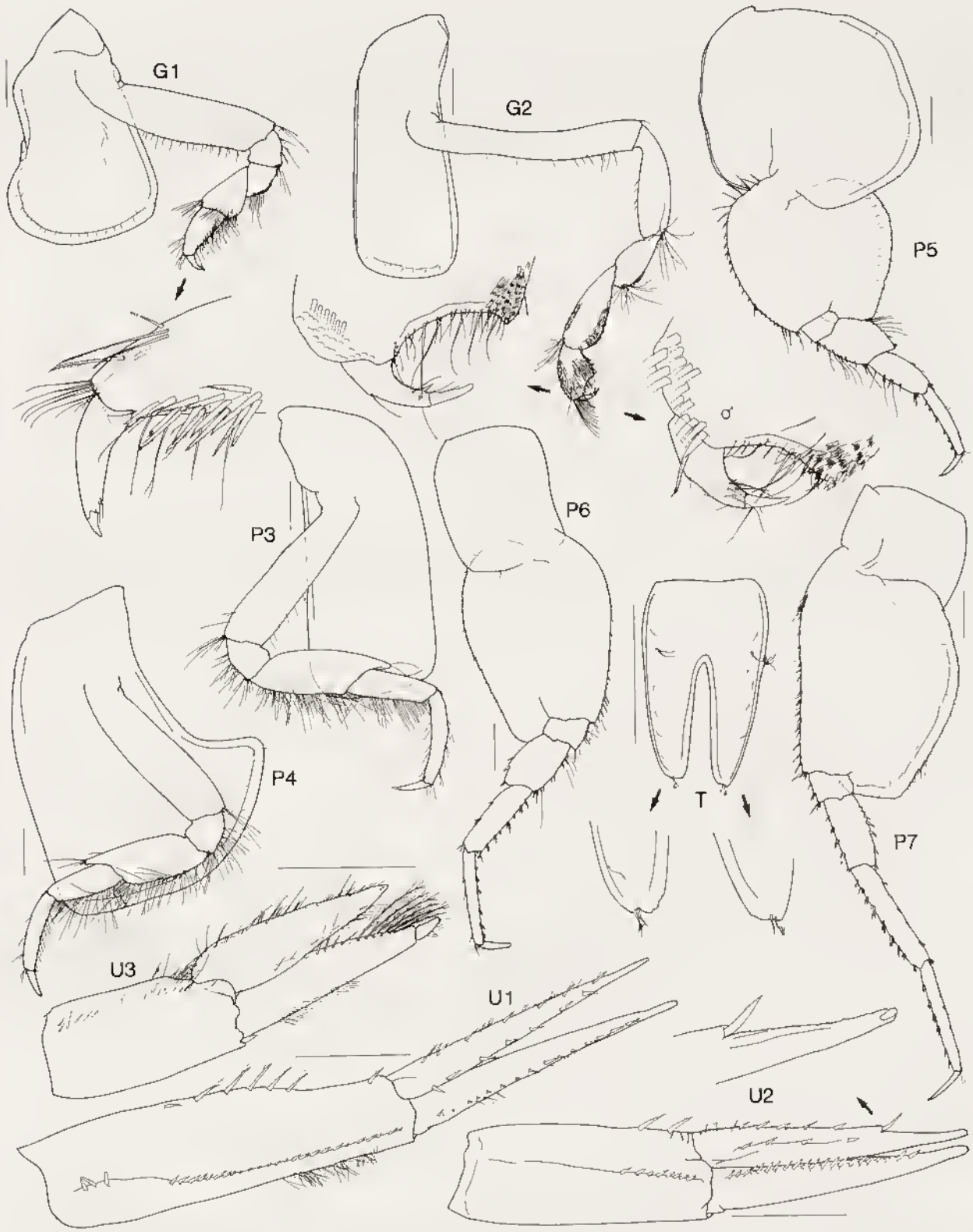

FIG. 38. — *Socarnes tiendi* sp. nov., holotype female, 16 mm (MNHN-Am 4429), off Havannah Channel, New Caledonia; paratype male, 12.5 mm (MNHN-Am 4386), east of Tiendi reef, Grand Récif Sud, New Caledonia. Scales represent 0.5 mm.

Source : MNHN, Paris

ETYMOLOGY. — Named for Tiendi reef near the type locality.

REMARKS. — *Socarnes tiendi* differs from *S. rurutu* and *S. tuscarora* in having a smoothly rounded apical margin on the outer plate of the maxilliped and a large gaped palm on gnathopod 2 in the male and female. In other respects *S. tiendi* and *S. tuscarora* are similar. *Socarnes tiendi* differs further from *S. rurutu* in having nodular spines on the inner plate of the maxilliped, a subquadrate corner on the basis of peraeopod 7, more numerous spines on the rami of uropod 2 and a more deeply cleft telson.

DISTRIBUTION. — *Socarnes tiendi* is known only from southern New Caledonia, in 350 to 365 m depth.

Socarnes tuscarora sp. nov.

Figs 39-41

MATERIAL EXAMINED. — **Wallis and Futuna Islands.** MUSORSTOM 7 : sln DW 555, 11°47'S, 178°19'W, Tuscarora Bank, South Pacific Ocean, 540-542 m, 19 May 1992 : adult ♂, 19.5 mm (MNHN-Am 4789).
Indonesia. KARUBAR : DW 32, 5°17'S, 132°51'E, Kei Islands, 170-206 m, 26 October 1991 : 1 ♂ (PPPO).

TYPES. — The male, 19.5 mm (MNHN-Am 4789) is the holotype.

TYPE LOCALITY. — Tuscarora Bank, South Pacific Ocean, 11°47'S, 178°19'E, 540-542 m depth.

DIAGNOSIS. — Maxilla 1 : palp with vestigial terminal spines. Maxilliped : inner plate with nodular spines. Gnathopod 2 : minutely subchelate, palm slightly obtuse with straight margin. Peraeopod 7 : posteroventral corner of basis subquadrate. Telson moderately cleft, about 60%.

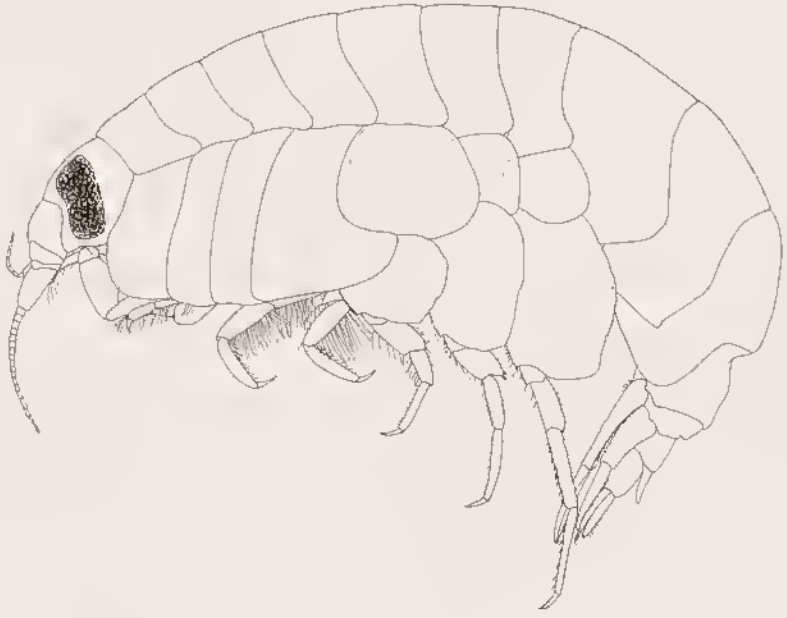

FIG. 39. — *Socarnes tuscarora* sp. nov., holotype male, 19.5 mm (MNHN-Am 4789), Tuscarora Bank, South Pacific Ocean.

DESCRIPTION. — Based on holotype male, 19.5 mm; female not known. *Head* : exposed, deeper than long; lateral cephalic lobe large, broad, subacute; rostrum absent; eyes reniform. *Antenna 1* : medium length, peduncular article 1 short, length 1 times breadth, without dorsal crest or tooth on distomedial margin or posterodistal tooth, without anterodistal projection; peduncular article 2 short, 0.3 times article 1, without anterodistal projection;

Source : MNHN, Paris

peduncular article 3 short, 0.19 times article 1; accessory flagellum medium length, 0.35 times primary flagellum, 8-articulate, article 1 short, 2.4 times article 2, not forming cap; flagellum 20-articulate, with strong 2-field callynophore in male, without flagellar spines, 9 calceoli present in adult male. *Antenna* 2 : much longer than body in male; peduncle with strong brush setae in male; male strongly geniculate between peduncular articles 4-5, article 3 short, 0.51 times article 4; peduncular article 4 short, broad, length 3.4 times breadth; flagellum well developed, at least 138-articulate in male, calceoli present in adult male.

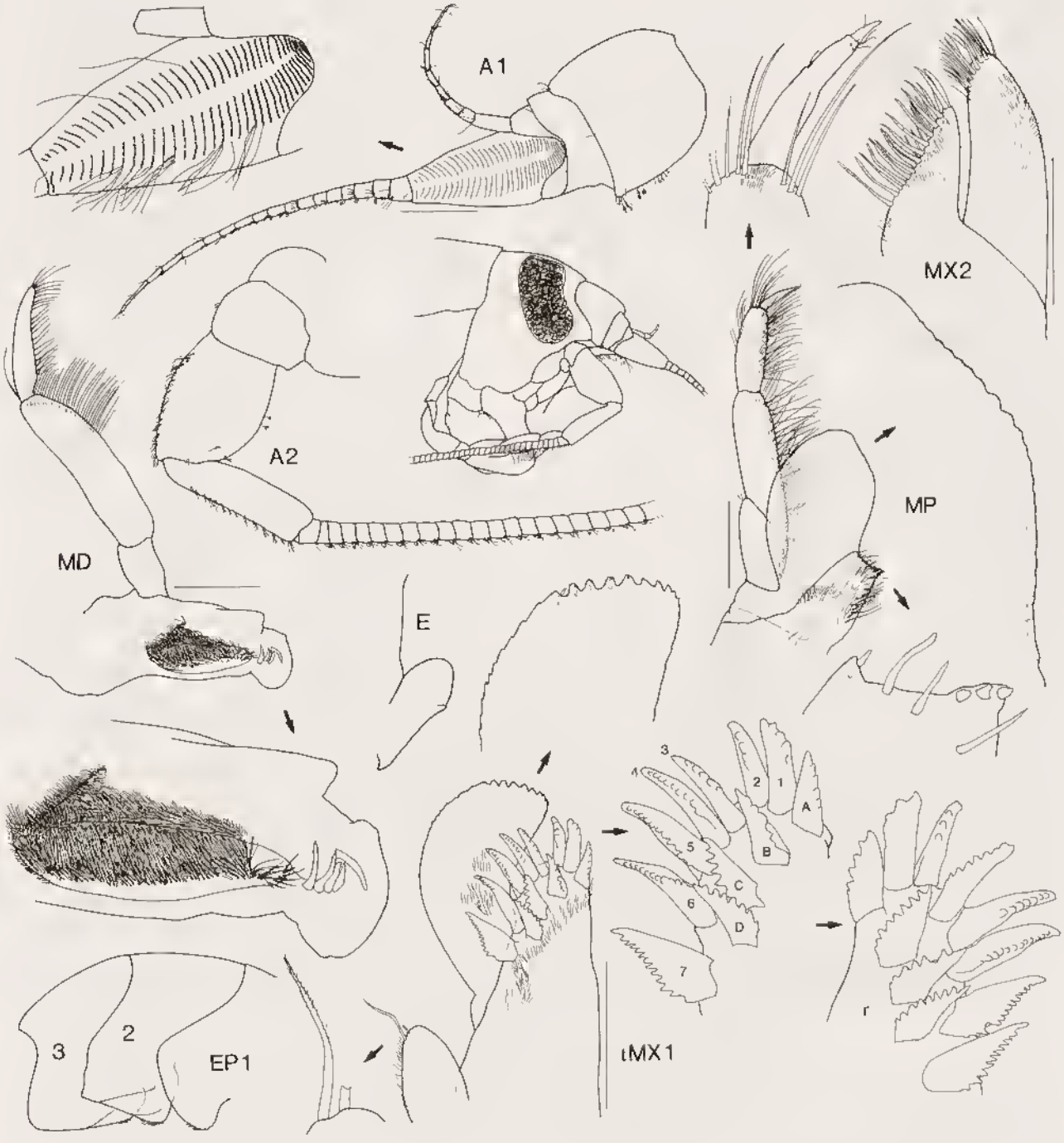

FIG. 40. — *Socarnes tuscarora* sp. nov., holotype male, 19.5 mm (MNHN-Am 4789), Tuscarora Bank, South Pacific Ocean. Scales represent 0.5 mm.

Source : MNHN, Paris

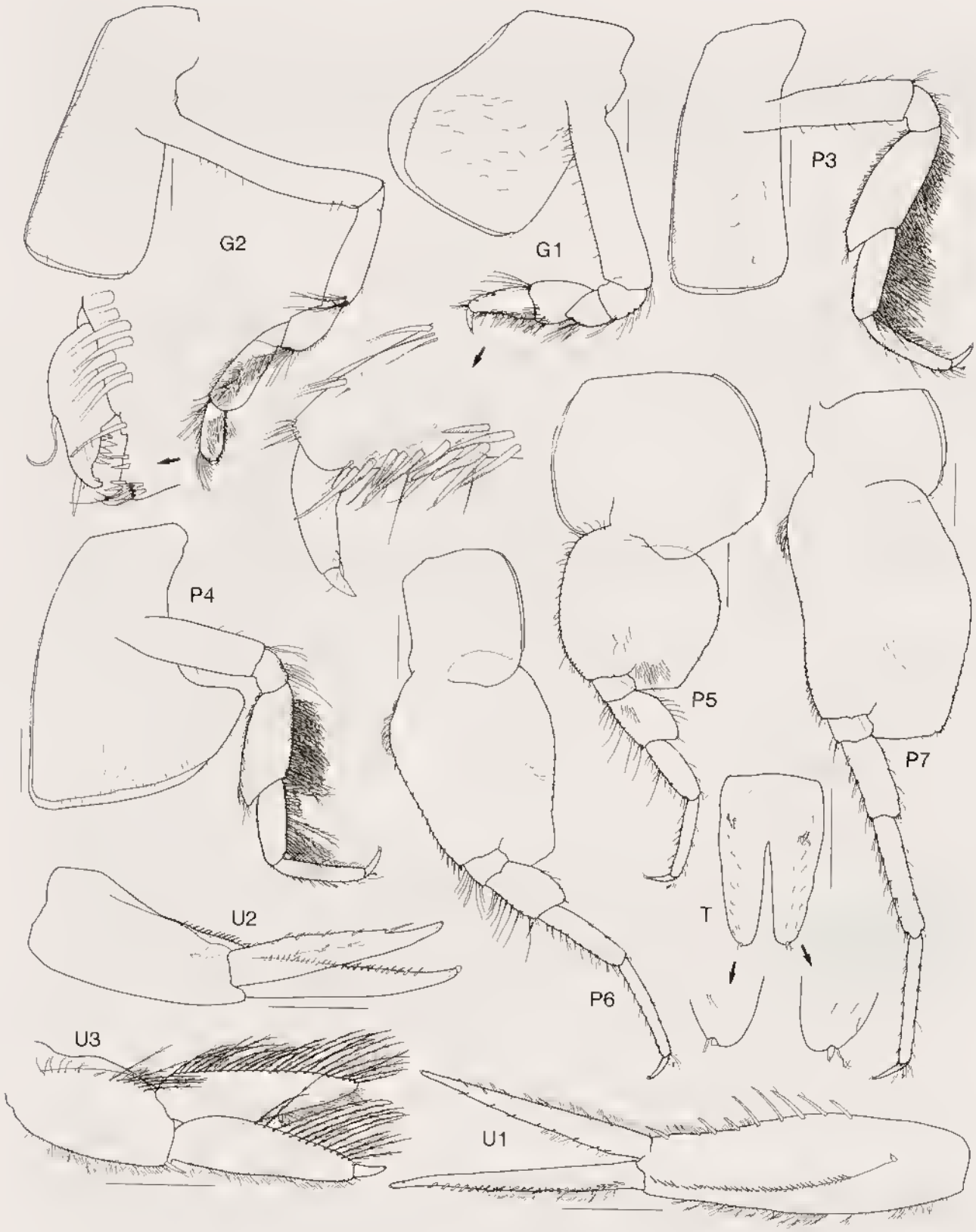

FIG. 41. — *Socarnes tuscarora* sp. nov., holotype male, 19.5 mm (MNHN-Am 4789), Tuscarora Bank, South Pacific Ocean. Scales represent 0.5 mm.

Source : MNHN, Paris

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate; epistome straight; upper lip produced, apically rounded. *Mandible* : incisors symmetrical, large, with strongly convex margins; left lacinia mobilis present, a long slender peg; accessory spine row without distal setal tuft, left and right rows each with 4 short, slender, "bushy" spines, without intermediate setae; molar setose with rudimentary distal triturating surface; mandibular palp attached proximally; article 1 short, length 1.6 times breadth; article 2 broad, length 3.8 times breadth, 1.5 times article 3, with 31 submarginal posterodistal A2-setae; article 3 falcate, long, length 4.9 times breadth, with 1 proximal A3-seta, with 12 proximal and 7 distal D3-setae and 3 apical E3-setae. *Maxilla 1* : inner plate narrow, with 2 plumose apical setae, outer seta without denticulate row; outer plate with 11 spine-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, multicuspidate, ST4, large, slender, 9-cuspidate, ST5 large, slender, 11-cuspidate, ST6 large, broad, 12-cuspidate, ST7 slightly displaced from ST6, large, broad, 11-cuspidate; inner row with STA large, broad, 4-cuspidate, STB large, broad, 7-cuspidate, STC large, broad, 6-cuspidate, STD long, slender, 7-cuspidate; palp large, 2-articulate, with vestigial spines on serrate apical margin, without subterminal setae, flag spine present (vestigial) on distolateral corner, distomedial margin serrate. *Maxilla 2* : inner plate narrow, outer plate broader, inner plate 0.69 times length outer plate. *Maxilliped* : inner plate large, subrectangular, with 3 apical nodular spines, oblique setal row strong with 4 distal plumose setae and double row of 10 medial plumose setae; outer plate small, subovate, distomedial margin obliquely truncated and slightly concave, without subapical notch, without apical setae, apical spines or medial spines, submarginal setae absent; palp large, 4-articulate; article 2 extremely slender, length 3.7 times breadth, 1.7 times article 3; article 3 long, slender, length 2.8 times breadth; dactylus well developed, with 4 subterminal setae, unguis present.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : simple; coxa large, as long as coxa 2, anterior margin concave, anteroventral corner produced, rounded, posterior margin straight; basis long, slender, length 3.9 times breadth, anterior margin smooth, with simple setae; ischium short, length 1.2 times breadth, anterior margin smooth; merus, posterior margin with group of long simple setae and patch of short setae; carpus subtriangular, short, length 1.5 times breadth, subequal in length to propodus, without denticulate patch near posterodistal margin; propodus large, subtriangular, length 2.1 times breadth, tapering distally, posterior margin smooth, subtly sinusoidal, with 14 spines, without disto-medial setae, without denticulate patch near posterior margin, palm absent; dactylus simple, without subterminal teeth or spines. *Gnathopod 2* : minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 3.5 times breadth; carpus long, length 3.1 times breadth, posterior margin broadly lobate; propodus subrectangular, long, length 2.3 times breadth, palm slightly acute, with straight, smooth margin, posterodistal corner without spines; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3 : coxa large; merus expanded anteriorly, male merus-carpus with plumose setae, female not known; propodus with 28 setae along posterior margin; dactylus short, slender. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior margin rounded, posterior margin sloping anteriorly; merus expanded anteriorly, male merus-carpus with plumose setae; propodus with 26 setae along posterior margin; dactylus short, slender. *Peraeopod 5* : coxa equilobate (also very large); basis expanded with posterior margin minutely crenate; merus expanded with rounded posterior margin; propodus with 10 spines and 2 distal spines along anterior margin; dactylus short, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis, anterior margin rounded proximally, straight distally, basis expanded posteriorly with minutely crenate posterior margin, without anteroventral lobe; merus expanded with rounded posterior margin; propodus with 14 spines and 1 distal spine along anterior margin; dactylus short, slender. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner subquadrate, posteroventral margin straight; merus not expanded posteriorly with 9 setae; propodus with 13 spines and 2 distal spines along anterior margin and 18 setae along posterior margin; dactylus short, slender.

Gills : from gnathopod 2 to peraeopod 7, with weak horizontal pleating.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner produced, narrowly rounded. *Epimeron 3* : posteroventral corner narrowly rounded. *Urosomites* : urosomite 1 with anterodorsal notch; urosomite 3 with 1 small dorsolateral spine. *Uropod 1* : with long fine setae; peduncle with 35 dorsolateral, 8 long dorsomedial and 1 apicomedial spines; outer ramus slightly longer than inner ramus, outer ramus with 26 lateral spines; inner ramus with 8 medial and 6 lateral spines. *Uropod 2* : without long fine setae; peduncle with 13 dorsolateral and 1 apicolateral spines, with 3 large midmedial spines, without plumose setae, without spines along distal margin;

Source : MNHN, Paris

rami subequal in length, outer ramus with 26 lateral spines; inner ramus with 3 medial and 4,1 lateral spines, and with weak constriction. *Uropod 3* : with long fine setae; peduncle well developed, short, length 1.7 times breadth, without dorsolateral flange, with 3 dorsolateral and 6 dorsomedial spines, without midlateral spines or setae, with 1 distoventral spine, with 9 simple setae, plumose setae present; rami lanceolate, subequal in length, outer ramus 2-articulate, article 2 short, article 1 with 1 medial spine; inner ramus without spines; plumose setae present in male. *Telson* : longer than broad, length 1.6 times breadth, moderately cleft (61%), without dorsal spines, with sparse dorsal setae, distal margins rounded in male, each with 1 simple marginal seta and 1 marginal spine.

ETYMOLOGY. — Named for Tuscarora Bank, the type locality.

REMARKS. — *Socarnes tuscarora* sp. nov. differs from *S. rurutu* in having a slightly obtuse palm on gnathopod 2, and a subquadrate posteroventral corner on the basis of peraeopod 7. *Socarnes tuscarora* differs from *S. tiendi* in having an incised apicomedial margin on the outer plate of the maxilliped and minutely subchelate gnathopod 2.

DISTRIBUTION. — *Socarnes tuscarora* is known from Tuscarora Bank, South Pacific Ocean and the Kei Islands, Banda Sea, in 170 to 540 m depth.

Genus *SOCARNOPSIS* Chevreux, 1911

Socarnopsis Chevreux, 1911 : 164. — CHEVREUX & FAGE, 1925 : 48. — J.L. BARNARD, 1969 : 363. — BARNARD & KARAMAN, 1991 : 532.

DIAGNOSIS. — Epistome and upper lip equally produced. Mandible : lacinia mobilis absent; molar setose with well developed triturating surface. Maxilla 1 : ST7 asymmetrical; palp with terminal spines. Gnathopod 1 : slightly subchelate.

TYPE SPECIES. — *Socarnopsis crenulata* Chevreux, 1911 (= *Anonyx filicornis* Heller, 1866), by monotypy.

SPECIES COMPOSITION. — *Socarnopsis* contains 7 species : *S. allecta* (Andres, 1981); *S. dissimulantia* (Imbach, 1967); *S. erythrophthalma* (Robertson, 1892); *S. filicornis* (Heller, 1866); *S. homiara* sp. nov.; *S. obesa* Chevreux, 1919; *S. tandai* sp. nov.

REMARKS. — *Socarnopsis filicornis* (Heller, 1866) now includes *S. schmardae* (Heller, 1866) and *S. crenulata* Chevreux, 1911, according to KRAPP-SCHICKEL, 1974, and DIVIACCO, 1984.

WALKER (1904) reported one specimen of *S. filicornis* (as *Socarnes schmardae*) from Sri Lanka, northern Indian Ocean. It seems unlikely that this is *S. filicornis*. WALKER did not illustrate his material. The very brief description is not sufficient to place it in a genus but does not preclude it from *Socarnopsis*.

K.H. BARNARD (1916) and GRIFFITHS (1974, 1975) have recorded *S. crenulata* from southern Africa. These records may not be the species now known as *S. filicornis* (they are not included in DIVIACCO & RUFFO's 1989 summary of distribution) but do seem to be in the genus *Socarnopsis*.

LEDOYER (1986) recorded several lots of material (previously reported in LEDOYER, 1967, 1972, 1973 and 1979) as *Socarnes obesa*. However, the material of LEDOYER, 1967 (originally recorded as *Orchomene* sp.) has an entire telson and is clearly not a species of *Socarnopsis*. The material of LEDOYER, 1972 (also originally recorded as *Orchomene* sp.) is possibly a species of *Socarnopsis* but differs from *S. obesa* in having a broadly rounded lateral cephalic lobe. The material LEDOYER, 1973 (the illustration of male in LEDOYER, 1986) is clearly a *Socarnopsis* but differs from *S. obesa* in having a straight epitome, a peak on the anterior margin of gnathopod 1 ischium, a much broader gnathopod 1 carpus and a differently shaped gnathopod 2 propodus. The material of LEDOYER, 1979 (the illustrations of female in LEDOYER, 1986) differs from *S. obesa* in having a broadly rounded lateral cephalic lobe and an almost chelate gnathopod 2. Although it has some characters of a *Socarnopsis*,

Source : MNHN, Paris

especially the epistome/upper lip complex and gnathopod 1 propodus, the text suggests that the maxilla 1 palp and mandibular molar are more like those of *Socarnes*.

DISTRIBUTION. — Mediterranean Sea; eastern North and South Atlantic Oceans; Red Sea; south-western North Pacific Ocean, north-western South Pacific Ocean; south-western Indian Ocean, ? northern Indian Ocean; immediate sublittoral to 1544 m depth.

Socarnopsis honiara sp. nov.

Figs 42-43

MATERIAL EXAMINED. — **Solomon Islands.** Stn SI-7, Rove, Honiara, Guadalcanal, 9°25.2'S, 159°56'E, baited trap on limestone reef with some live coral heads and sand patches, 3 m, R.T. SPRINGTHORPE, 28-29 September 1991 : 10 specimens (MNHN-Am 4790); 44 specimens (AM P42150). — Stn SI-8, Rove, Honiara, Guadalcanal, 9°25.2'S, 159°56'E, baited trap on limestone reef with some live coral heads and sand patches, 4 m, R.T. SPRINGTHORPE, 28-29 September 1991 : 137 specimens (AM P42151). — Stn SI-9, Rove, Honiara, Guadalcanal, 9°25.2'S, 159°56'E, baited trap on limestone reef with some live coral heads and sand patches, 5 m, R.T. SPRINGTHORPE, 28-29 September 1991 : 1 ♀, 4.1 mm (AM P42152); 1 ♂, 2.5 mm (AM P42153); 180 specimens (AM P42154).

TYPES. — The female, 4.1 mm (AM P42152) is the holotype. The other specimens are paratypes.

TYPE LOCALITY. — Rove, Honiara, Guadalcanal, Solomon Islands, 9°25.2'S, 159°56'E, 5 m.

DIAGNOSIS. — Antenna 1 with midmedial spines on callynophore. Antenna 2 of male subequal in length to antenna 1. Gnathopod 1: ischium with sharp peak on anterior margin. Epimeron 3: posteroventral corner narrowly rounded. Telson deeply cleft, about 70%.

DESCRIPTION. — Based on holotype female, 4.1 mm (AM P42152); male paratype, 2.5 mm (AM P42153). *Head* : exposed, deeper than long; lateral cephalic lobe large, broad, distally truncated; rostrum small; eyes reniform, dark brown/black in alcohol, not enlarged in adult male. *Antenna 1* : peduncular article 1 short, length 1 times breadth, without tooth on distomedial margin, posterodistal tooth or anterodistal projection; peduncular article 2 short, 0.33 times article 1, without anterodistal projection; peduncular article 3 short, 0.2 times article 1; accessory flagellum long, 0.5 times primary flagellum, 5-articulate, article 1 long, 1.8 times article 2, not forming cap; flagellum 9-articulate (male 7), with strong 2-field callynophore with midmedial spines in female and male, flagellum without flagellar spines, calceoli absent in female and male. *Antenna 2* : subequal in length to antenna 1 (same in male); peduncle without brush setae in female and male, weakly geniculate between peduncular articles 3-4, article 3 short, 0.52 times article 4 (male weakly geniculate between peduncular articles 3-4, article 3 short, 0.47 times article 4), peduncular articles 4 and 5 not enlarged in male or female; flagellum well developed, 9-articulate (male 6), without thick setal brush, calceoli absent in female (1 present in adult male).

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate; epistome concave; upper lip slightly produced, rounded. *Mandible* : incisors symmetrical, small, with strongly convex margins; laciniae mobilis absent; accessory spine row without distal setal tuft, left row with 3, right with 4 short, robust, "bushy" spines, without intermediate setae; molar setose with well developed triturating surface; mandibular palp attached proximally; article 1 short, length 1.2 times breadth; article 2 slender, length 4.2 times breadth, 1.5 times article 3, with 5 (male 3) submarginal posterodistal A2-setae, without D2-setae; article 3 falcate, long, length 4.3 times breadth, without proximal A3-setae, with 3 (male 2) proximal and 2 (male 2) distal D3-setae and 2 apical E3-setae. *Maxilla 1* : inner plate narrow with 2 plumose apical setae, outer seta without denticulate row; outer plate with 11 spine-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, weakly to multicuspidate, ST4 large, stout, 4-cuspidate, ST5 large, stout, 4- to 5-cuspidate, ST6 large, very broad, multicuspidate distomedially, left and right ST7 asymmetrical, slightly displaced from ST6, left large, broad, 5-cuspidate distally, right large, very broad, 7-cuspidate distomedially; inner row with STA large, very broad, slightly displaced from STB-STD, multicuspidate along entire medial margin, STB-STD large, broad,

Source : MNHN, Paris

multicuspidate along entire medial margin; palp large, 2-articulate, with 5 short terminal spines, without subterminal setae, flag spine present on distolateral corner, distomedial margin serrate. *Maxilla 2* : inner plate narrow, outer plate broader, inner plate 1 times length outer plate. *Maxilliped* : inner plate large, subrectangular,with 3 apical nodular spines, oblique setal row reduced with 6 plumose setae; outer plate small,

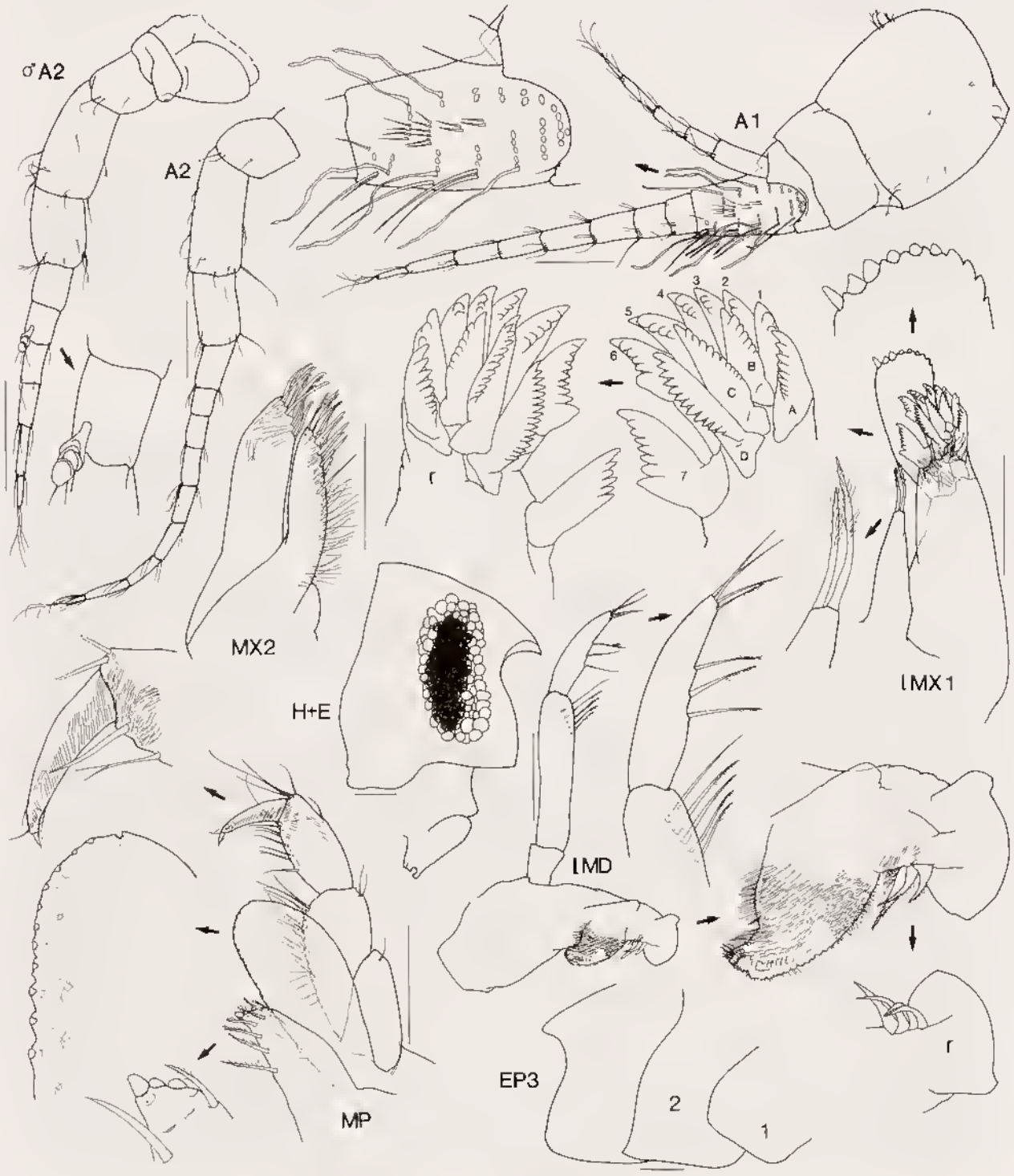

FIG. 42. — *Socarnopsis honiara* sp. nov., holotype female, 4.1 mm (AM P42152); paratype male, 2.5 mm (AM P42153); Rove, Honiara, Guadalcanal, Solomon Islands. Scales represent 0.1 mm.

Source : MNHN, Paris

subovate, without subapical notch, without apical setae or spines, medial spines vestigial, submarginal setae short, simple; palp large, 4-articulate; article 2 slender, length 2.1 times breadth, 1.4 times article 3; article 3 long, slender, length 2.1 times breadth; dactylus well developed, with 2 subterminal setae, unguis present.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : subchelate; coxa large, slightly shorter than coxa 2, anterior margin concave, anteroventral corner produced, rounded, posterior margin slightly convex; basis long, slender, length 3 times breadth, anterior margin smooth, with simple setae; ischium short, length 1 times breadth, anterior margin with sharp peak; merus, posterior margin with patch of short setae and with a few simple setae; carpus subrectangular, short, length 1.9 times breadth, longer than (1.1 times) propodus, with patch of very fine setae near posterior margin; propodus large, subrectangular, length 2.1 times breadth, tapering distally, posterior margin smooth, straight, with 2 spines, without denticulate patch near posterior margin, palm extremely acute, margin straight, smooth, posterodistal corner with 1 medial and 1 lateral spines; dactylus complex, with large subterminal tooth and row of at least 25 medial spines near anterior margin. *Gnathopod 2* : minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 2.6 times breadth; carpus long, length 2.6 times breadth, posterior margin broadly lobate; propodus subquadrate, short, length 1.4 times breadth, palm slightly obtuse, with straight, serrate margin, posterodistal corner without spines; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3 ; coxa large; merus weakly expanded anteriorly, merus-carpus without plumose setae; propodus with 4 setae and 2 distal spines along posterior margin; dactylus short, slender. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus weakly expanded anteriorly, merus-carpus without plumose setae; propodus with 4 setae and 2 distal spines along posterior margin; dactylus short, slender. *Peraeopod 5* : coxa equilobate, very large; basis expanded with posterior margin scalloped, anterior margin with small glands at base of distal setae; merus expanded with rounded posterior margin; propodus with 4 spines and 2 distal spines along anterior margin; dactylus short, slender. *Peraeopod 6* ; coxa small, not lobate posteriorly; basis expanded posteriorly with smooth posterior margin, without anteroventral lobe; merus slightly expanded posteriorly; propodus with 1 seta and 2 distal spines along anterior margin; dactylus short, slender. *Peraeopod 7* : basis expanded posteriorly, anterior margin with small glands at base of proximal setae, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus slightly expanded, convex posterior margin with 3 short spines; propodus with 2 distal spines on anterior margin and 3 setae on posterior margin; dactylus short, slender.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* : from gnathopod 2 to peraeopod 6, strongly pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 3* ; posteroventral corner narrowly rounded. *Urosomites* : dorsally smooth. *Uropod 1* : without fine setae; peduncle with 5 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial spines; rami subequal in length, outer ramus with 3 dorsal spines; inner ramus with 2 dorsal spines. *Uropod 2* ; without fine setae; peduncle without dorsolateral flange, with 1 dorsolateral, 1 apicolateral and 1 apicomedial spines, without plumose setae, without spines along distal margin; outer ramus slightly shorter than inner ramus, outer ramus with 2 dorsal spines; inner ramus with 2 dorsal spines, without constriction. *Uropod 3* : peduncle well developed, long, length 2 times breadth, without dorsolateral flange, with 1 dorsolateral and 1 apicolateral spines, without midlateral spines or setae, without distoventral spines or plumose setae; rami lanceolate, subequal in length, outer ramus 2-articulate, article 2 short, rami without spines, plumose setae absent in female and male. *Telson* : longer than broad, length 1.9 times breadth, deeply cleft (72%), without dorsal spines, with sparse dorsal setae, distal margins incised slightly, without marginal penicillate setae, with 1-2 simple marginal setae on each lobe, without marginal spines.

ETYMOLOGY. — Named for the town of Honiara, near the type locality.

REMARKS. — This is the second report of midmedial spines on the callynophore of a tysianassoid. The other occurrence, in *Aristias uokonia*, is in a genus not considered to be closely related to *Socarnopsis*, which indicates that the spines are independently derived. The spines in *S. honiara* are not as robust as those of *A. uokonia*. *Socarnopsis honiara* and *S. tandai* apparently differ from all other species in the genus in having midmedial spines on the callynophore.

Source : MNHN, Paris

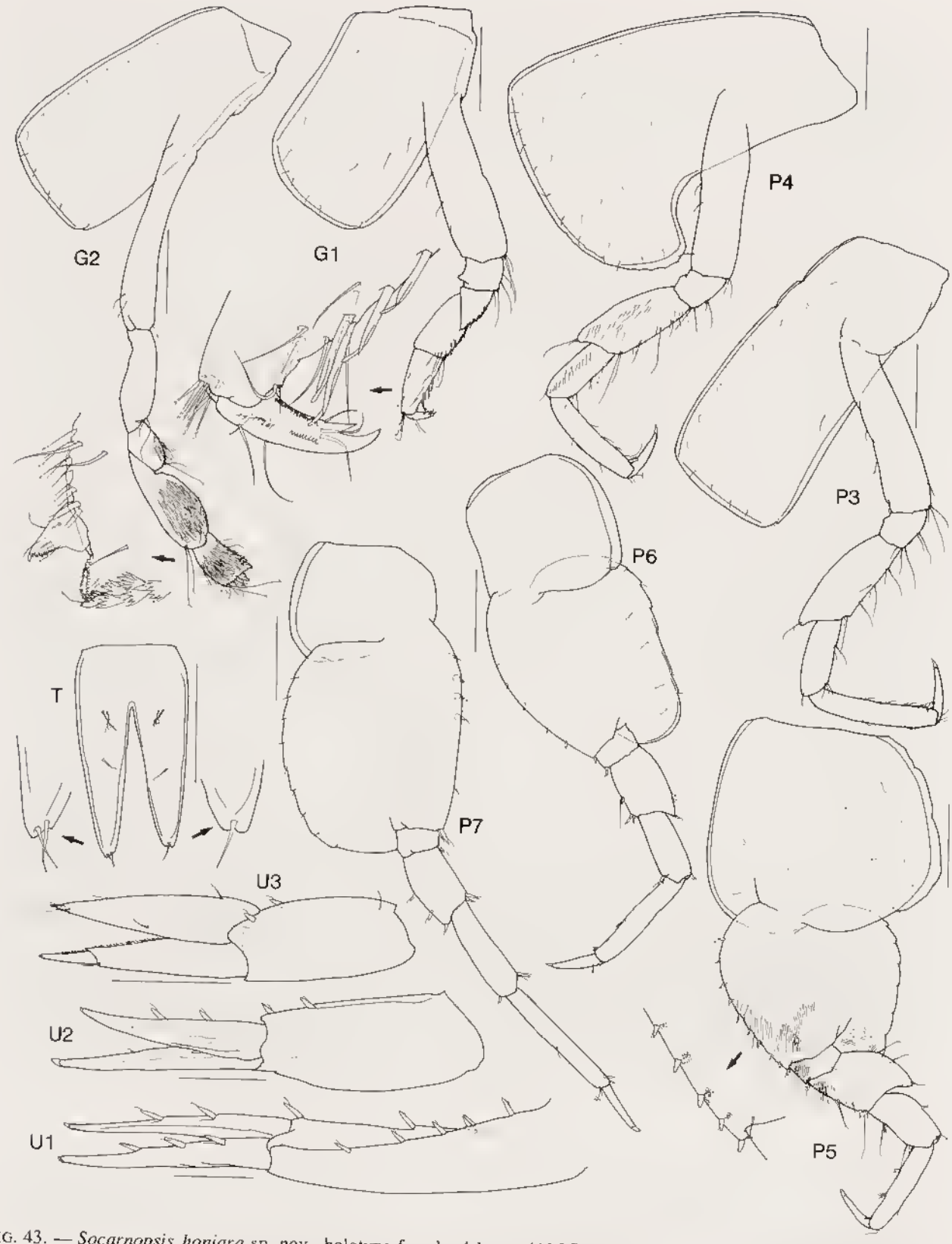

FIG. 43. — *Socarnopsis honiara* sp. nov., holotype female, 4.1 mm (AM P42152); paratype male, 2.5 mm (AM P42153); Rove, Honiara, Guadalcanal, Solomon Islands. Scales for U1-3, T represent 0.1 mm, remainder represent 0.2 mm.

Source : MNHN, Paris

Socarnopsis honiara is one of two species in the genus in which the male second antenna does not become elongate. The other is *S. erythrophthalma*, from which *S. honiara* differs in having dark brown eyes, a well-developed callynophore in both female and male and a more deeply cleft telson.

DISTRIBUTION. — *Socarnopsis honiara* is known from Guadalcanal, Solomon Islands, in 3 to 5 m depth.

Socarnopsis tandai sp. nov.

Figs 44-45

MATERIAL EXAMINED. — **Solomon Islands.** Stn SI-11, Rove, Honiara, Guadalcanal, 9°25.2'S, 159°56'E, baited trap near small coral head on sand bottom, 25 m, R.T. SPRINGTHORPE, 29-30 September 1991 : 1 ♀, 4.8 mm (AM P42252); 1 ♂, 4.2 mm (AM P42253); 80 specimens (AM P42155); 20 specimens (MNHN-Am 4795). — Stn SI-12, Rove, Honiara, Guadalcanal, 9°25.2'S, 159°56'E, baited trap near small coral head, algal beds on sandy slope, 20 m, R.T. SPRINGTHORPE, 29-30 September 1991 : 22 specimens (AM P42156). — Stn SI-13, Rove, Honiara, Guadalcanal, 9°25.2'S, 159°56'E, baited trap near small coral head on sandy slope, 16 m, R.T. SPRINGTHORPE, 29-30 September 1991 : 9 specimens (AM P42157). — Stn SI-19, 300 m north-west of Tandai Point, Guadalcanal, 9°23'S, 159°52.5'E, baited trap on sand/rubble bottom under overhang near bed of corallline algae, 24 m, R.T. SPRINGTHORPE, 6-7 October 1991 : 3 specimens (AM P42158). — Stn SI-20, 300 m north-west of Tandai Point, Guadalcanal, 9°23'S, 159°52.5'E, baited trap near small coral head, 18 m, R.T. SPRINGTHORPE, 6-7 October 1991 : 6 specimens (AM P42159).

TYPES. — The female, 4.8 mm (AM P42252) is the holotype. The other specimens are paratypes.

TYPE LOCALITY. — Rove, Honiara, Guadalcanal, Solomon Islands, 9°25.2'S, 159°56'E, 25 m.

DIAGNOSIS. — Antenna 1 with midmedial spines on callynophore. Antenna 2 of male elongate. Gnathopod 1: ischium with sharp peak on anterior margin. Epimeron 3: posteroventral corner broadly rounded. Telson deeply cleft, about 70%.

DESCRIPTION. — Based on holotype female, 4.8 mm (AM P42252); paratype male, 4.2 mm (AM P42253). *Head* : exposed, deeper than long, lateral cephalic lobe large, broad, distally truncated; rostrum small; eyes reniform, colour faded red in alcohol, not enlarged in adult male. *Antenna 1* : peduncular article 1 short, length 1 times breadth; peduncular article 2 short, 0.36 times article 1, without anterodistal projection; peduncular article 3 short, 0.2 times article 1; accessory flagellum medium length, 0.36 times primary flagellum, 5-articulate, article 1 long, 1.9 times article 2 (male long, 2 times article 2), not forming cap; flagellum 14-articulate (male 14), with strong 2-field callynophore with midmedial spines in female and male, without flagellar spines, calceoli absent in female and male. *Antenna 2* : subequal in length to antenna 1 (longer than body in male); peduncle without brush setae in female and male, weakly geniculate between peduncular articles 3-4, article 3 short, 0.42 times article 4 (male weakly geniculate between peduncular articles 3-4, article 3 short, 0.6 times article 4), peduncular article 4 enlarged in male; flagellum well developed, 12-articulate (male 51), calceoli absent in female (6 present in adult male on articles 38, 40, 42, 44, 46, 48).

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate, epistome concave, upper lip slightly produced, rounded. *Mandible* : incisors symmetrical, small, with strongly convex margins; lacinia mobilis absent; accessory spine row without distal setal tuft, left row with 3, right row with 4 short, robust, multiserrate setae; intermediate setae absent; molar setose with well developed triturating surface; mandibular palp attached proximally; article 1 short, length 1.5 times breadth; article 2 slender, length 5.9 times breadth, 1.5 times article 3, with 5 submarginal posterodistal A2-setae (male 5), without D2-setae; article 3 falcate, long, length 5.3 times breadth, without A3-setae, with 4 proximal D3-setae (male 5), with 2 distal D3-setae (male 2) and 2 apical E3-setae. *Maxilla 1* : inner plate narrow, with 2 plumose apical setae, outer seta without denticulate row; outer plate with 11 spine-teeth in 6/5 arrangement, outer row with ST1 to ST3 large, stout, weakly to multicuspidate, ST4 large, stout, 4-cuspidate, ST5 large, stout, 5-cuspidate, ST6 large, very broad, 8-cuspidate distomedially, left and right ST7 asymmetrical, slightly displaced from ST6, left large, broad, 5-cuspidate distally, right very broad, 9-cuspidate distomedially; inner row with STA large, very broad, slightly displaced from STB,

Source : MNHN, Paris

FIG. 44. — *Socarnopsis tandai* sp. nov., holotype female, 4.8 mm, AM P42252; paratype male, 4.2 mm (AM P42253); Rove, Honiara, Guadalcanal, Solomon Islands. Scales represent 0.1 mm.

Source : MNHN, Paris

multicuspidate along entire medial margin, STB-STD large, broad, multicuspidate along entire medial margin; palp large, 2-articulate, with 7 short terminal spines, without subterminal setae, flag spine present on distolateral corner, distomedial margin serrate. *Maxilla 2* : inner plate narrow, outer plate broader, inner plate 0.8 times length outer plate. *Maxilliped* : inner plate large, subrectangular, with 3 apical nodular spines, oblique setal row reduced with 7 plumose setae; outer plate small, subovate, without subapical notch, without apical setae or spines, medial setae vestigial, submarginal setae short, simple; palp large, 4-articulate, article 2 broad, length 2.4 times breadth, 1.6 times article 3, article 3 long, slender, length 2.4 times breadth, dactylus well developed, with 2 subterminal setae, unguis present.

Peraeonites 1 to 7 dorsally smooth. *Gnathopod 1* : weakly subchelate; coxa large, slightly shorter than coxa 2, anterior margin concave, anteroventral corner produced, rounded, posterior margin slightly convex; basis long, slender, length 4.3 times breadth, anterior margin smooth, with simple setae; ischium short, length 1.2 times breadth, anterior margin with sharp peak; merus, posterior margin with patch of short setae and a few simple setae; carpus subrectangular, long, length 2 times breadth, longer than (1.1 times) propodus, with patch of very fine setae near posterior margin; propodus large, subrectangular, length 2.3 times breadth, tapering distally, posterior margin smooth, straight, with 2 spines, palm extremely acute, margin straight, smooth, posterodistal corner with 1 medial and 1 lateral spine; dactylus complex, with large subterminal tooth and row of 28 medial spines near anterior margin. *Gnathopod 2* : minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 2.8 times breadth; carpus long, length 3 times breadth, posterior margin broadly lobate; propodus subquadrate, short, length 1.5 times breadth, palm slightly obtuse, with straight, serrate margin, posterodistal corner without spines; dactylus not reaching corner of palm, posterior margin serrate.

Peraeopod 3 : coxa large; merus expanded anterodistally along carpus; merus-carpus without plumose setae in male and female; propodus with 5 slender setae and 2 distal spines along posterior margin; dactylus short, slender. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus expanded anterodistally along carpus; merus-carpus without plumose setae in male and female; without posterodistal spur; propodus with 4 slender setae and 2 distal spines along posterior margin; dactylus short, slender. *Peraeopod 5* : coxa equilobate (very large); basis expanded with posterior margin minutely crenate; merus expanded with rounded posterior margin; propodus with 4 slender setae along anterior margin and 2 distal spines; dactylus short, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis, anterior margin rounded, basis expanded posteriorly with minutely crenate posterior margin; merus slightly expanded and rounded posteroproximally, straight posterodistally with 2 setae; propodus with 7 spines long anterior margin; dactylus short, slender. *Peraeopod 7* : basis expanded posteriorly, anterior margin with small glands at the base of proximal setae, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus slightly expanded, convex posterior margin with 3 spines; propodus with 7 spines along anterior margin and 9 slender setae along posterior margin; dactylus short, slender.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* : from gnathopod 2 to peraeopod 6, with strong horizontal pleating.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner rounded. *Epimeron 3* : posteroventral corner broadly rounded. *Urosomites*: dorsally smooth. *Uropod 1* : with long fine setae; peduncle with 5 dorsolateral, 1 apicolateral, 2 dorsomedial and 1 apicomedial spine; rami subequal in length; outer ramus with 4 dorsal spines, inner ramus with 2 dorsal spines. *Uropod 2* : without fine setae; peduncle without dorsolateral flange, with 1 dorsolateral, 1 apicolateral and 1 apicomedial spine, without plumose setae, without spines along distal margin; outer ramus slightly shorter than inner ramus; outer ramus with 3 dorsal spines, inner ramus with 3 dorsal spines; inner ramus without constriction. *Uropod 3* : with long fine setae; peduncle long, length 2.2 times breadth, without dorsolateral flange, with 1 dorsolateral and 1 apicolateral spine, without midlateral setae or spines, without distoventral spines, without plumose setae; rami lanceolate, subequal in length, outer ramus 2-articulate, article 2 short, rami without spines, slender plumose setae absent in female and male. *Telson* : longer than broad, length 2.2 times breadth, deeply cleft (68%), without dorsal spines, with sparse dorsal setae, distal margins incised slightly, with 1 marginal penicillate seta on each lobe, with 1-2 marginal simple setae on each lobe, without marginal spines.

ETYMOLOGY. — Named for Tandai Point, one of the localities at which the species is found.

Source : MNHN, Paris

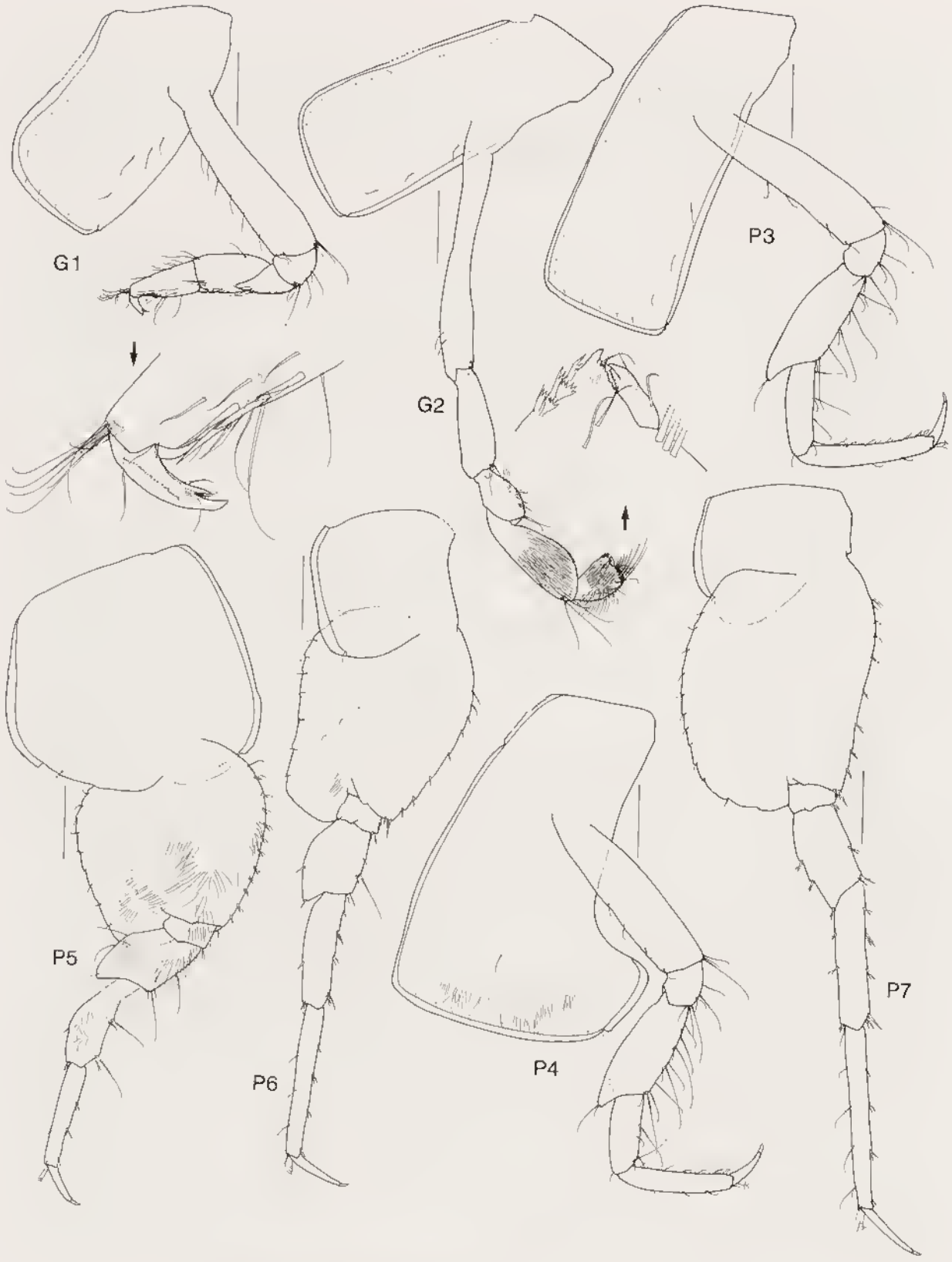

FIG. 45. — *Socarnopsis tandai* sp. nov., holotype female, 4.8 mm (AM P42252), Rove, Honiara, Guadalcanal, Solomon Islands. Scales represent 0.2 mm.

Source : MNHN, Paris

REMARKS. — *Socarnopsis tandai* is easily distinguished from *S. allecta*, *S. dissimulantia* and *S. obesa* by the sharp peak on the anterior margin of the gnathopod 1 ischium. It is very similar to *S. filicornis*, but differs in having a slightly more concave epistome, a smaller triturating area on the molar, a broader article 2 of the maxillipedal palp, an anterodistal bulge on the propodus of gnathopod 2 and a slightly rounder posteroventral corner on epimeron 3.

Socarnopsis tandai is extremely similar to *S. honiara*. There are small differences in the relative length of the flagellum and accessory flagellum of antenna 1, the breadth of articles 2 and 3 of the maxillipedal palp and the taper of the head lobe. The two species can be separated by differences in adult size, eye colour and the adult male antenna 2 which is elongate with an enlarged peduncular article 4 in *S. tandai* but subequal to that of the female in *S. honiara*. LINCOLN (1979) recognized the same close relationship, including the male antenna 2, in the North Atlantic species in *S. filicornis* (as *S. crenulatus*) and *S. erythrophthalma*.

Although we have only a small number of samples, from a limited area, it seems that the two species of *Socarnopsis* from the Solomon Islands occur in different habitats. *Socarnopsis honiara* was taken only in traps set on limestone reefs, in 3 to 5 metres depth; *S. tandai* was taken in traps set on sandy bottoms in 18 to 25 metres depth.

DISTRIBUTION. — *Socarnopsis tandai* is known from Guadalcanal, Solomon Islands, in 18 to 25 m depth.

Genus *STEPHONYX* Lowry & Stoddart, 1989

Stephonyx sp.

MATERIAL EXAMINED. — **New Caledonia**. CHALCAL 2 : stn DW 76, 23°40.50'S, 167°45.20'E, south of the Isle of Pines, 470 m, 30 October 1986 : 1 specimen (MNHN-Am 4428).

REMARKS. — LOWRY & STODDART are preparing a monograph on the genus *Stephonyx*. This species will be described in that report.

Genus *TRISCHIZOSTOMA* Boeck, 1861

Trischizostoma richeri sp. nov.

Figs 46-48

MATERIAL EXAMINED. — **Loyalty Islands**. BIOGEOCAL : stn CP 321, 21°12.0'S, 166°59.85'E, Loyalty Islands Basin, 2190-2205 m, 3 May 1987 : 1 ♀, 41 mm, ovigerous, 8 eggs (MNHN-Am 4458).

TYPES. — The unique specimen is the holotype.

TYPE LOCALITY. — Loyalty Islands Basin, 21°12.0'S, 166°59.85'E, 2190 to 2205 m.

DIAGNOSIS. — Maxillipedal palp 4-articulate, styliform, longer than outer plate. Gnathopod 1 : propodus oval, 0.45 times as long as broad. Telson entire, distally subacute.

DESCRIPTION. — Based on holotype female, 41 mm; male not known. *Head* : exposed, deeper than long; lateral cephalic lobe absent; rostrum large; eyes covering most of head, expanded dorsally and nearly confluent. *Antenna 1* : short, 0.16 times body; peduncular article 1 short, length 0.9 times breadth, without tooth on distomedial margin; peduncular article 2 short, 0.2 times article 1, without anterodistal projection; peduncular article 3 short, 0.2 times article 1; accessory flagellum medium length, 0.4 times primary flagellum, at least 4-articulate, article 1 long, 8.8 times article 2, forming cap partially covering callynophore; flagellum 11-articulate, with strong 2-field callynophore, with 1 long spine on article 3, calceoli absent in female.

Source : MNHN, Paris

Antenna 2 : length 1.6 times antenna 1; peduncle with weak brush setae, peduncular article 1 greatly enlarged, not covering article 2, weakly geniculate between peduncular articles 3-4, article 3 short, 0.32 times article 4; flagellum well developed, 29-articulate, without thick setal brush, calceoli absent in female.

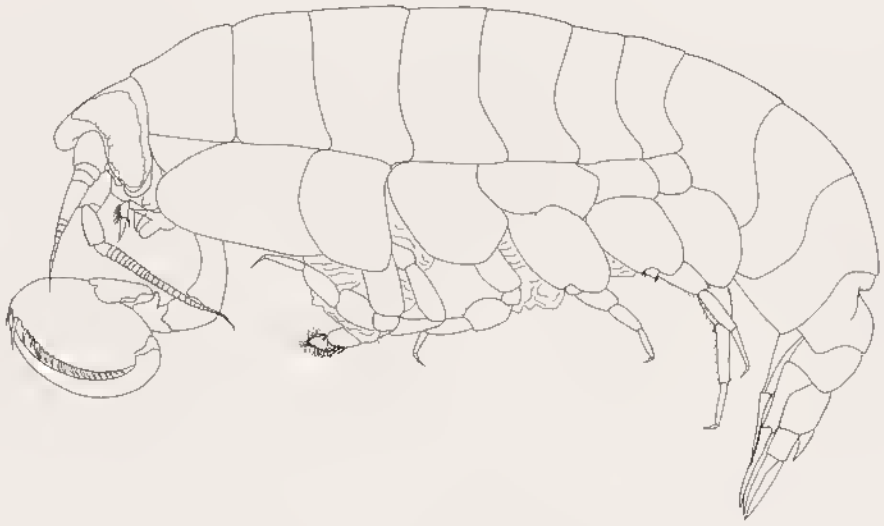

FIG. 46. — *Trischizostoma richeri* sp. nov., holotype female, 41 mm (MNHN-Am 4458), Loyalty Islands Basin.

Mouthpart bundle : conical. *Epistome* and *upper lip* : fused, sinusoidal. *Mandible* : incisors symmetrical, very small at tip of styliform projection; laciniae mobilis absent; accessory spine row absent; molar absent; mandibular palp attached proximally; article 1 short, length 0.6 times breadth; article 2 broad, length 2.8 times breadth, 1.1 times article 3, with many A2-setae, with about 25 D2-setae on distal third of posterior margin; article 3 falcate, long, length 2.9 times breadth, without proximal A3-setae, with 19 D3-setae along most of posterior margin and 1 apical E3-seta. *Maxilla 1* : inner plate narrow with 1 simple apical seta; outer plate narrow with 8 spine-teeth in modified 8/3 crown arrangement; outer row with ST1 to ST3 large, stout, without cusps, ST4 large, stout, smooth, ST5-ST7 absent; inner row with STA large, stout, displaced from STB-STD, without cusps, STB-STD short, slender, without cusps; palp small, 1-articulate, with 2 apical setae, without subterminal setae, flag spine absent, distomedial margin smooth. *Maxilla 2* : inner and outer plates narrow, inner plate 1 times length outer plate. *Maxilliped* : inner plate very large, substyliform, with 2 apical vestigial nodular spines; outer plate small, subovate, without subapical notch, apical setae, apical spines or medial spines, submarginal setae vestigial; palp large, 4-articulate, styliform, geniculate between articles 2 and 3; article 2 broad, length 2 times breadth, 1 times article 3; article 3 long, broad, length 1.9 times breadth; dactylus longest of all, slender, lanceolate with smooth anterior margin, with 2 terminal setae, unguis absent.

Peraeonites : 1 to 7 dorsally smooth. *Gnathopod 1* : subchelate; coxa vestigial; basis long, slender, length 4.9 times breadth, anterior margin smooth, without setae; ischium short, length 1.5 times breadth; merus and carpus rotated, propodus and dactylus inverted in adult, posterior margin without setae; carpus subtriangular, compressed, shorter than propodus, without denticulate patch near posterodistal margin; propodus massive, subovate, length 0.45 times breadth, margins diverging distally, posterior margin smooth, convex, without spines or setae, without denticulate patch near posterior margin, palm slightly acute, margin convex, lined with row of short, thick spines, posterodistal corner with 3 medial and 2 lateral spines; dactylus simple, without subterminal teeth or spines. *Gnathopod 2* : minutely subchelate; coxa large, larger than coxa 3, anteroventral corner rounded, ventral margin straight; ischium long, length 3.75 times breadth; carpus long, length 3.6 times breadth, posterior margin straight; propodus produced anterodistally beyond dactylus, short, length 1.7 times breadth, palm slightly acute, with straight, smooth margin, without spines; dactylus, posterior margin smooth.

Peraeopod 3 : coxa large; merus weakly expanded anteriorly; propodus with 3 setae along posterior margin; dactylus short, slender. *Peraeopod 4* : coxa deeper than wide, with weak posteroventral lobe, anterior margin

Source : MNHN, Paris

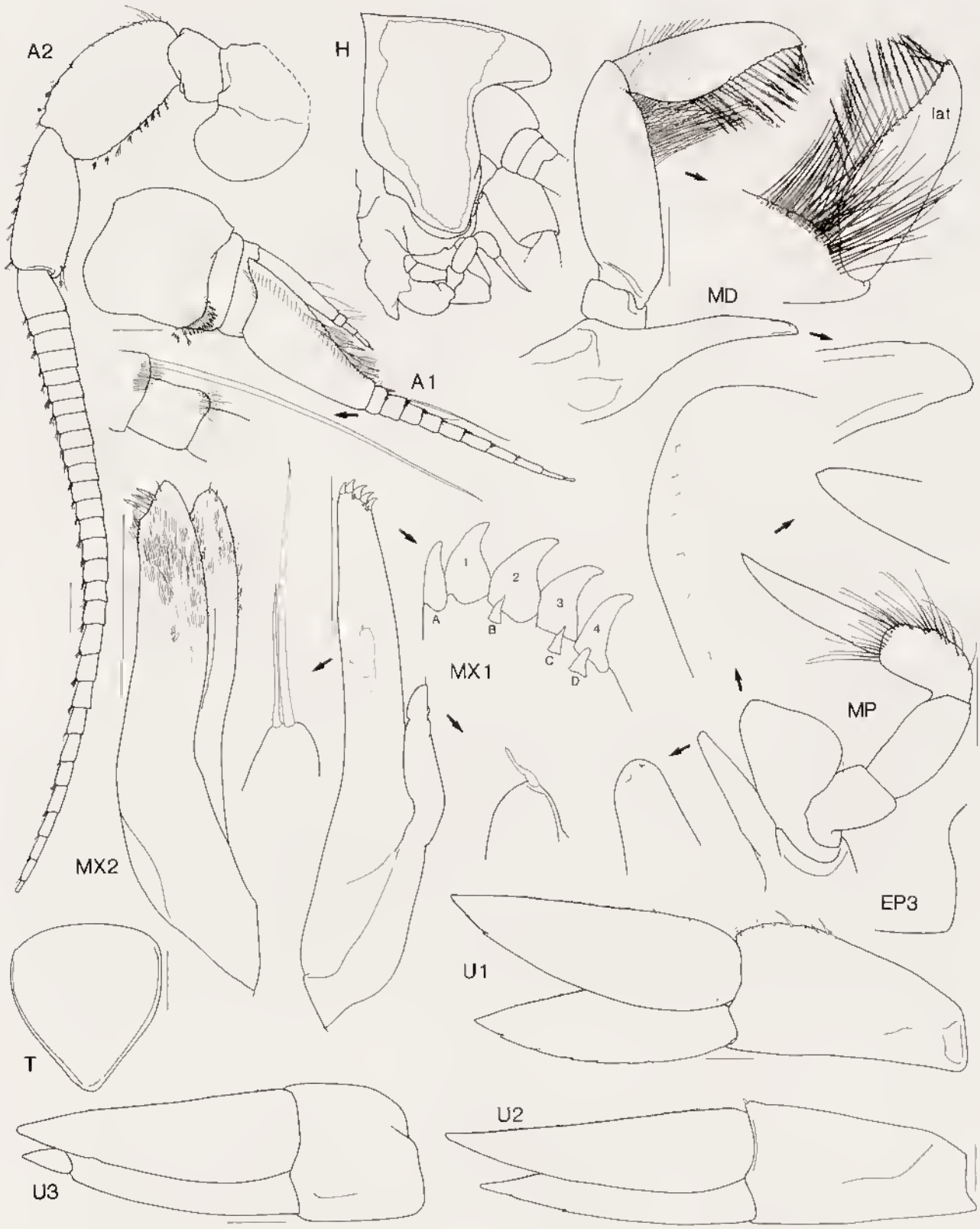

FIG. 47. — *Trischizostoma richeri* sp. nov., holotype female, 41 mm (MNHN-Am 4458), Loyalty Islands Basin. Scales represent 0.5 mm.

Source : MNHN, Paris

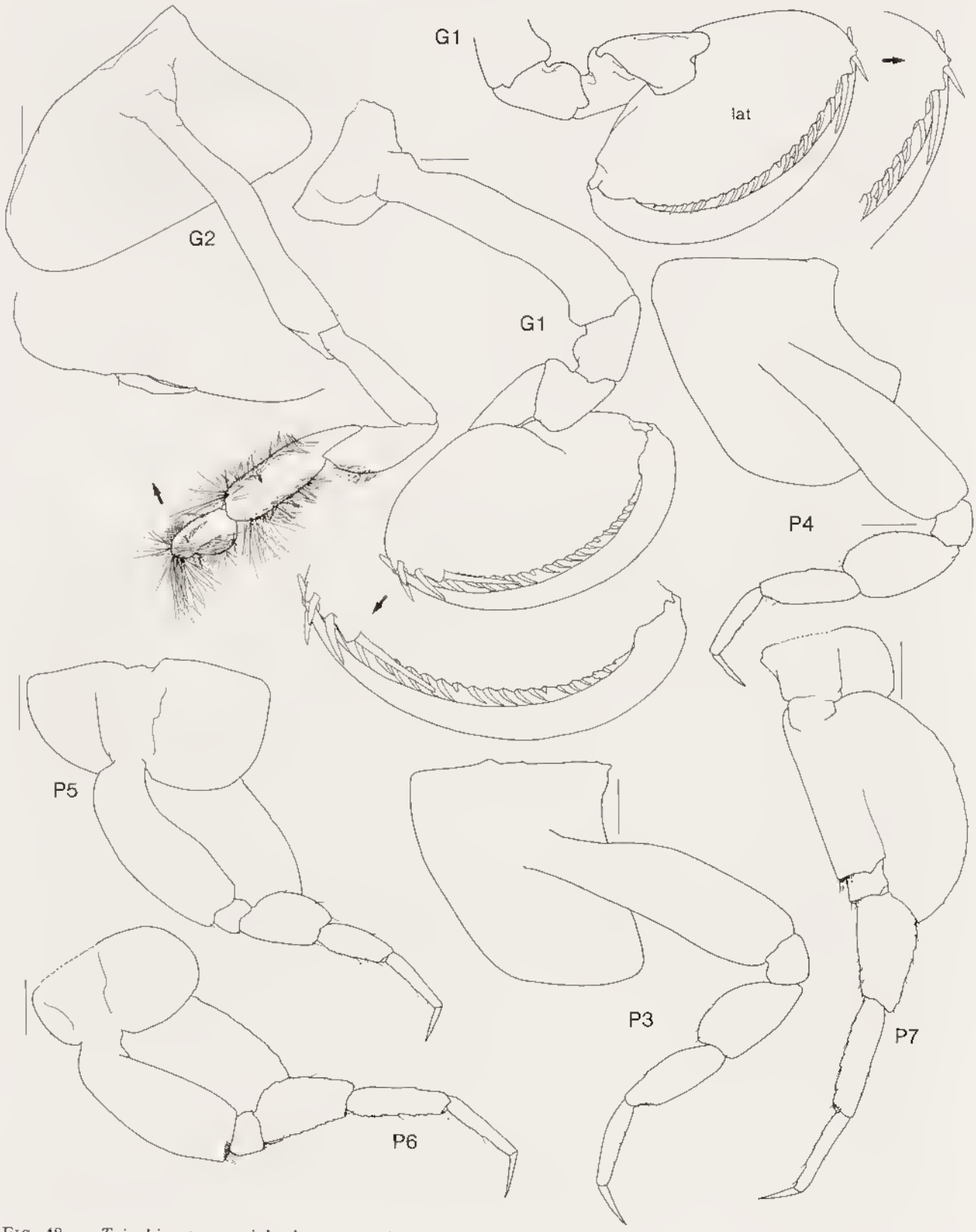

FIG. 48. — *Trischizostoma richeri* sp. nov., holotype female, 41 mm (MNHN-Am 4458), Loyalty Islands Basin. Scales represent 1.0 mm.

Source : MNHN, Paris

broadly rounded, posterior margin slightly sloping anteriorly; merus expanded anteriorly and posteriorly; propodus with 3 setae along posterior margin; dactylus short, slender. *Peraeopod 5* : coxa equilobate; basis expanded with posterior margin smooth; merus expanded with rounded posterior margin; propodus with 3 setae along anterior margin; dactylus short, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis expanded with broad posteroventral lobe, without anteroventral lobe; merus expanded proximally, posterior margin straight, converging distally, with 4 spines; propodus with 3 setae along anterior margin; dactylus short, slender. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral margin rounded; merus expanded proximally, posterior margin straight, converging distally, with 6 spines; propodus with 6 setae along anterior margin and 2 setae along posterior margin; dactylus short, slender.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* ; from gnathopod 2 to peraeopod 7, with strong horizontal pleating.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner broadly rounded. *Epimeron 3* : posteroventral corner subquadrate. *Urosomites* : urosomite 1 with anterodorsal notch. *Uropod 1* : peduncle with 9 dorsomedial and 1 apicomedial spines; outer ramus slightly shorter than inner ramus, outer ramus with 6 lateral spines; inner ramus with 2 lateral spines. *Uropod 2* : peduncle without dorsolateral flange, with 1 apicolateral spine, without spines along distal margin; outer ramus slightly shorter than inner ramus, rami without spines; inner ramus without constriction. *Uropod 3* : peduncle well developed, short, length 0.92 times breadth, without dorsolateral flange, without dorsal spines, midlateral spines or setae or distoventral spines; biramous, rami lanceolate, subequal in length, outer ramus 2-articulate, article 2 short, rami without spines. *Telson* : longer than broad, length 1.1 times breadth, entire, without dorsal setae, margins converging distally, apically subacute, without marginal penicillate or simple setae, without marginal spines.

ETYMOLOGY. — Named for Bertrand RICHER DE FORGES, carcinologist, and architect of the ORSTOM collecting program in the tropical western Pacific Ocean.

REMARKS. — *Trischizostoma richeri* is a distinctive species which appears most similar to *T. longirostre* Chevreux, 1919, and *T. macrochela* Vinogradov, 1990. In these three species the telson is entire, the maxillipedal palp is much longer than the outer plate, the propodus of gnathopod 1 is oval and much deeper than long and the palm is smooth. *Trischizostoma richeri* has a shorter rostrum than does *T. longirostre* (described more fully by CHEVREUX, 1927), the dorsodistal protuberance on the propodus of gnathopod 2 is stronger and the telson is subacute distally, not truncated. Although *T. richeri* and *T. macrochela* share the above characters they are very different. In *T. macrochela* the mandibular palp is weakly setose, the palp of maxilla 1 is completely absent, the maxillipedal palp, although much longer than the outer plate, is weakly developed and not styliform, the palm of gnathopod 1 is weakly spinose, the peraeopods are slender and the telson is rounded. *Trischizostoma richeri* differs from the other species in the Indo-west Pacific, *T. crosnieri* Lowry & Stoddart, 1993, as follows : the anteroventral corner of coxa 2 is rounded; the merus is not as well developed in peraeopods 3 and 4; the basis of peraeopod 5 has a rounded posteroventral corner and the telson is entire and subtriangular.

Species of *Trischizostoma* are known as ectoparasites on fish. The host species for *T. richeri* is not known.

DISTRIBUTION. — *Trischizostoma richeri* is currently known from the Loyalty Islands Basin in 2200 m depth.

Genus *TRYPHOSELLA* Bonnier, 1893

Tryphosella ama sp. nov.

Figs 49-51

MATERIAL EXAMINED. — **New Caledonia.** CALSUB : stn PL 20, 22°52.7'S, 167°23'E, south of the Isle of Pines, 555-616 m, 10 March 1989 : 1 female, 9.5 mm, ovigerous (MNHN-Am 4791); 5 specimens (MNHN-Am 4791); 2 specimens (AM P42160).

TYPES. — The female, 9.5 mm (MNHN-AM 4792), is the holotype. The other specimens are paratypes.

Source : MNHN, Paris

TYPE LOCALITY. — South of the Isle of Pines, New Caledonia, 22°52.7'S, 167°23'E, 555 to 616 m.

DIAGNOSIS. — Lateral cephalic lobe large, broad, down-turned. Eyes apparently absent. Epistome : slightly produced, rounded. Maxilliped : outer plate with 3 vestigial apical spines. Gnathopod 1 : carpus slightly longer than propodus; palm acute. Epimeron 3 : posteroventral corner narrowly rounded. Urosomite 1 rounded, with rounded boss. Uropod 2 : inner ramus with moderate constriction.

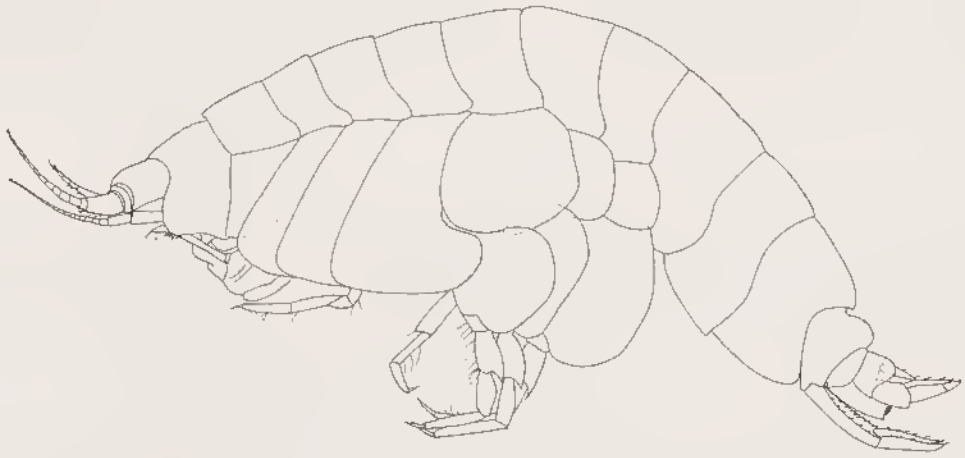

FIG. 49. — *Tryphosella ania* sp. nov., holotype female, 9.5 mm (MNHN-Am 4791), south of the Isle of Pines, New Caledonia.

DESCRIPTION. — Based on holotype female, 9.5 mm; male not known. *Head and body* : without setae. *Head* : exposed, deeper than long; lateral cephalic lobe large, broad, down-turned, distally rounded; rostrum absent; eyes apparently absent. *Antenna 1* : medium length, 0.2 times body; peduncular article 1 short, length 1.3 times breadth, without tooth on distomedial margin, posterodistal tooth or anterodistal projection; peduncular article 2 short, 0.22 times article 1, without anterodistal projection; peduncular article 3 short, 0.15 times article 1; accessory flagellum long, 0.51 times primary flagellum, 9-articulate, article 1 long, 3.1 times article 2, not forming cap; flagellum 16-articulate, with strong 2-field callynophore, with 2 small posterodistal setae, without flagellar spines, calceoli absent. *Antenna 2* : subequal in length to antenna 1; peduncle without brush setae, weakly geniculate between peduncular articles 3-4, article 3 short, 0.42 times article 4, peduncular articles 4 and 5 not enlarged; flagellum well developed, 16-articulate, calceoli absent.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate; epistome slightly produced, rounded; upper lip slightly produced, rounded. *Mandible* : incisors symmetrical, large, with strongly convex margins; left lacinia mobilis present, a stemmed distally serrate blade; accessory spine row without distal setal tuft, left row with 4, right with 3 short, slender, "bushy" spines, with 3 "whip-like" intermediate setae; molar proximally setose, distally triturating; mandibular palp attached midway; article 1 short, length 1.2 times breadth; article 2 slender, length 6.1 times breadth, 2.3 times article 3, with 16 submarginal posterodistal A2-setae, without B2-setae or D2-setae; article 3 falcate, long, length 3.4 times breadth, with 1 proximal A3-seta, without B3-setae, with 16 D3-setae along most of posterior margin and 2 apical E3-setae. *Maxilla 1* : inner plate narrow with 2 simple apical setae, outer seta with denticulate row; outer plate with 11 spine-teeth in 6/5 arrangement; outer row with ST1 large, stout, multicuspidate, ST2 and ST3 weakly cuspidate, ST4 large, stout, 4-cuspidate, ST5 large, stout, 6-cuspidate, ST6 large, stout, multicuspidate, ST7 slightly displaced from ST6, large, broad, with convex multicuspidate medial margin; inner row with STA large, very broad, slightly displaced from STB-STD, multicuspidate along entire medial margin, STB-STD large, broad, multicuspidate along entire medial margin; palp large, 2-articulate, with 7 short terminal spines, with 1-2 subterminal setae, flag spine present on distolateral corner, distomedial margin smooth. *Maxilla 2* : inner and outer plates narrow, inner plate 0.8 times length outer plate. *Maxilliped* : inner plate large, subrectangular, with 3 apical nodular spines, with 2 distal spines on lateral

Source : MNHN, Paris

FIG. 50. — *Tryphosella ama* sp. nov., holotype female, 9.5 mm (MNHN-Am 4791), south of the Isle of Pines, New Caledonia. Scales represent 0.2 mm.

Source : MNHN, Paris

face near inner margin, oblique setal row strong with 17 plumose setae; outer plate medium size, subovate, without subapical notch or apical setae, with 3 vestigial apical spines, medial spines present, small, submarginal setae short, simple; palp large, 4-articulate; article 2 slender, length 3.2 times breadth, 1.6 times article 3; article 3 long, slender, length 2.3 times breadth; dactylus well developed, with 3 subterminal setae, unguis present.

Peraeonites 1 to 7 dorsally smooth. *Gnathopod 1* : subchelate; coxa large, slightly shorter than coxa 2, tapering distally, anterior margin concave, anteroventral corner produced, rounded, posterior margin distally angled

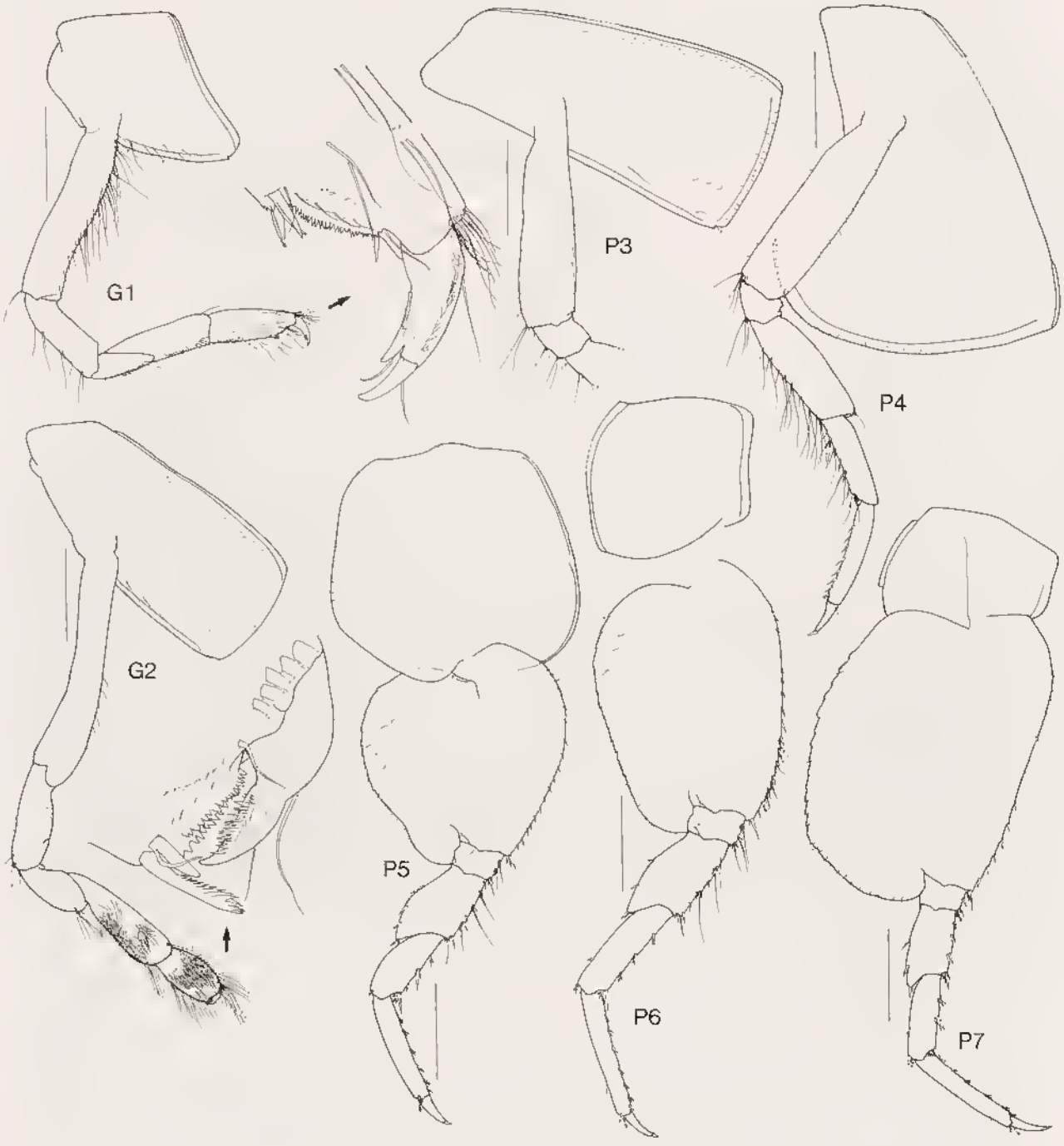

FIG. 51. — *Tryphosella ama* sp. nov., holotype female, 9.5 mm (MNHN-Am 4791), south of the Isle of Pines, New Caledonia. Scales represent 0.5 mm.

Source : MNHN, Paris

towards anterior margin; basis long, slender, length 4.9 times breadth, anterior margin smooth, with simple setae; ischium long, length 3 times breadth, anterior margin smooth; merus, posterior margin with patch of short setae; carpus subrectangular, long, length 3.3 times breadth, longer than (1.2 times) propodus, with patch of very fine setae near posterior margin; propodus large, subrectangular, length 2.7 times breadth, margins subparallel, posterior margin smooth, straight, with setae, with very fine setae near posterior margin, palm acute, margin straight, serrate, posterodistal corner with 1 medial and 1 lateral spines; dactylus complex, with large subterminal tooth and row of many medial spines near anterior margin. *Gnathopod 2* : minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 2.9 times breadth; carpus long, length 3.3 times breadth, posterior margin broadly lobate; propodus subquadrate, short, length 1.6 times breadth, posterior margin without strong distal spines, palm transverse, with straight, serrate margin, posterodistal corner with 1 medial spine; dactylus reaching corner of palm, posterior margin serrate.

Peraeopod 3 : coxa large; merus, propodus and daclylus unknown. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus not expanded anteriorly, merus-carpus without plumose setae; propodus with 7 spines and 2 distal spines along posterior margin; dactylus short, slender. *Peraeopod 5* : coxa bilobate, posterior lobe slightly produced ventrally; basis expanded with posterior margin minutely crenate; merus slightly expanded posteriorly; propodus with 10 spines and 2 distal spines along anterior margin; dactylus short, slender. *Peraeopod 6* : coxa small, not lobate posteriorly; basis expanded posteriorly with minutely crenate posterior margin, without anteroventral lobe; merus slightly expanded and rounded posteroproximally, straight posterodistally with 3 setae; propodus with 11 spines and 2 distal spines along anterior margin; dactylus short, slender. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus anterior and posterior margins subparallel; propodus with 8 spines and 2 distal spines along anterior margin and 2 distal spines along posterior margin; dactylus short, slender.

Oostegites : from gnathopod 2 to peraeopod 5. *Gills* : from gnathopod 2 to peraeopod 7, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 1* : anteroventral corner narrowly rounded. *Epimeron 3* : posteroventral corner narrowly rounded. *Urosomites* : urosomite 1 with rounded boss, without lateral flange; urosomite 3 without small dorsolateral spine. *Uropod 1* : without fine setae; peduncle with 6 dorsolateral, 1 apicolateral, 6 dorsomedial and 1 apicomedial spines; rami subequal in length, outer ramus with 6 dorsal spines; inner ramus with 6 dorsal spines. *Uropod 2* : without fine setae; peduncle without dorsolateral flange, with 8 dorsolateral, 1 apicolateral, 3 dorsomedial and 1 apicomedial spines, without plumose setae, without spines along distal margin; rami subequal in length, outer ramus with 7 dorsal spines; inner ramus with 4 dorsal spines, with moderate constriction. *Uropod 3* : peduncle well developed, short, length 1.6 times breadth, without dorsolateral flange, with 2 apicolateral and 1 dorsal spines, without midlateral spines or setae, with 3 distoventral spines, with plumose setae; biramous, rami lanceolate, inner ramus reduced, about 0.8 times outer ramus, outer ramus 2-articulate, article 2 short, article 1 with 5 lateral and 1 medial spines; inner ramus with 4 medial and 2 lateral spines, plumose setae present in female. *Telson* : longer than broad, length 1.5 times breadth, deeply cleft (81%), with 2 dorsal spines on each lobe, with sparse dorsal setae, distal margins incised, with 1 marginal penicillate setae on each lobe, without simple marginal setae, with 1 marginal spine on each lobe.

ETYMOLOGY. — Named for Ama Island, the southern-most island in the Isle of Pines group.

REMARKS. — Because of the size of the genus the following comparison is restricted geographically. *Tryphosella ama* is atypical of the genus in having a long ischium on gnathopod 1 and a constricted inner ramus on uropod 2. We have other Indo-west Pacific species under study which also have these characters and we cannot yet assess their importance at the generic level. *Tryphosella ama* and *T. oupi* both have narrowly rounded posteroventral corners on epimeron 3. *Tryphosella ama* differs from *T. oupi* in having a more slender antenna 1 with more articles in the accessory and primary flagella, a shorter article 3 on the mandibular palp, 3 or 4 vestigial apical spines on the outer plate of the maxilliped and a more slender maxillipedal palp, a more acute palm on gnathopod 1 and large dorsal spines on the telson.

DISTRIBUTION. — *Tryphosella ama* is known only from southern New Caledonia, in 555 to 616 m depth.

Source : MNHN, Paris

Tryphosella oupi sp. nov.

Figs 52-53

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn CP 75, 22°18.65'S, 167°23.30'E, north of the Isle of Pines, 825-860 m, 4 September 1985 : 1 ♂, 5.5 mm (MNHN-Am 4381).

TYPES. — The unique specimen is the holotype.

TYPE LOCALITY. — North of the Isle of Pines, New Caledonia, 22°18.65'S, 167°23.30'E, 825 to 860 m.

DIAGNOSIS. — Lateral cephalic lobe subacute. Eyes apparently absent. Epistome : slightly produced, rounded. Maxilliped : outer plate with 2 apical spines. Gnathopod 1 : carpus length 1 times propodus; palm slightly acute. Epimeron 3 : posteroventral corner narrowly rounded. Urosomite 1 rounded, with anterodorsal notch.

DESCRIPTION. — Based on holotype male, 5.5 mm; female unknown. *Head* : exposed, deeper than long; lateral cephalic lobe large, broad, subacute; rostrum absent; eyes apparently absent. *Antenna 1* : peduncular article 1 short, length 1 times breadth, without tooth on distomedial margin, posterodistal tooth or anterodistal projection; peduncular article 2 short, 0.19 times article 1, without anterodistal projection; peduncular article 3 long, 0.23 times article 1; accessory flagellum long, 0.52 times primary flagellum, 4-articulate, article 1 long, 3.1 times article 2, not forming cap; flagellum male 8-articulate, with strong 2-field callynophore without posterodistal setae or spines, without flagellar spines, calceoli absent. *Antenna 2* : subequal in length to antenna 1; peduncle without brush setae in male, weakly geniculate between peduncular articles 3-4, article 3 short, 0.49 times article 4, peduncular articles 4 and 5 not enlarged; flagellum well developed, 11-articulate, calceoli present.

Mouthpart bundle : subquadrate. *Epistome* and *upper lip* : separate; epistome slightly produced, rounded; upper lip not produced, straight. *Mandible* : incisors symmetrical, large, with strongly convex margins; left lacinia mobilis present, a stemmed distally serrate blade; accessory spine row without distal setal tuft, left and right rows each with 3 long, slender, "bushy" spines, with 4 "whip-like" intermediate setae; molar proximally setose, distally triturating; mandibular palp attached midway; article 1 short, length 1.1 times breadth; article 2 slender, length 4.2 times breadth, 1.3 times article 3, with 8 A2-setae, without B2-setae or D2-setae; article 3 falcate, long, length 3.9 times breadth, with 1 proximal A3-seta, without B3-setae, with 12 D3-setae along most of posterior margin and 2 apical E3-setae. *Maxilla 1* : inner plate narrow with 2 plumose apical setae, outer seta with denticulate row; outer plate with 11 spine-teeth in 6/5 arrangement; outer row with ST1 to ST3 large, stout, weakly cuspidate, ST4 large, stout, 3-cuspidate, ST5 large, stout, 5-cuspidate, ST6 large, stout, multicuspidate, ST7 slightly displaced from ST6, large, broad, with convex multicuspidate medial margin; inner row with STA large, very broad, slightly displaced from STB-STD, 6-cuspidate, STB large, broad, 6-cuspidate, STC large, broad, 7-cuspidate, STD large, broad, multicuspidate along medial margin; palp large, 2-articulate, with 4 long terminal spines, with 1 subterminal seta, flag spine present on distolateral corner, distomedial margin smooth. *Maxilla 2* : inner and outer plates narrow, inner plate 0.9 times length outer plate. *Maxilliped* : inner plate large, subrectangular, with 3 apical nodular spines, with 2 distal spines on lateral face near inner margin, oblique setal row strong with 9 plumose setae; outer plate small, subovate, without subapical notch or apical setae, with 2 apical spines, medial spines present, small, submarginal setae short, simple; palp large, 4-articulate; article 2 very broad, length 2 times breadth, 1.4 times article 3; article 3 short, broad, length 1.75 times breadth; dactylus well developed, with 3 subterminal setae, unguis present.

Peraeonites 1 to 7 dorsally smooth. *Gnathopod 1* : subchelate; coxa large, slightly shorter than coxa 2, tapering distally, anterior margin straight, posterior margin distally angled towards anterior margin; basis long, slender, length 3.2 times breadth, anterior margin smooth, with simple setae; ischium short, length 1 times breadth, anterior margin smooth; merus, posterior margin with patch of short setae; carpus subrectangular, short, length 1.8 times breadth and 1 times propodus, without patch of very fine setae near posterior margin; propodus without very fine setae near posterior margin; propodus large, subrectangular, length 2 times breadth, margins subparallel, posterior margin smooth, straight, with setae, without denticulate patch near posterior margin, palm

Source : MNHN, Paris

slightly acute, margin sinusoidal, serrate, posterodistal corner with 1 medial and 1 lateral spines; dactylus simple, with subterminal tooth. *Gnathopod 2* : minutely subchelate; coxa large, subequal in size to coxa 3; ischium long, length 2.7 times breadth; carpus long, length 3.7 times breadth, posterior margin straight; propodus

FIG. 52. — *Tryphosella oupi* sp. nov., holotype male, 5.5 mm (MNHN-Am 4381), north of the Isle of Pines, New Caledonia. Scales for A1, 2, H+E represent 0.2 mm, remainder represent 0.1 mm.

Source : MNHN, Paris

subrectangular, short, length 1.7 times breadth, palm slightly obtuse, with straight, serrate margin, posterodistal corner with 1 medial spine; dactylus reaching corner of palm, posterior margin smooth proximally with serrate tip.

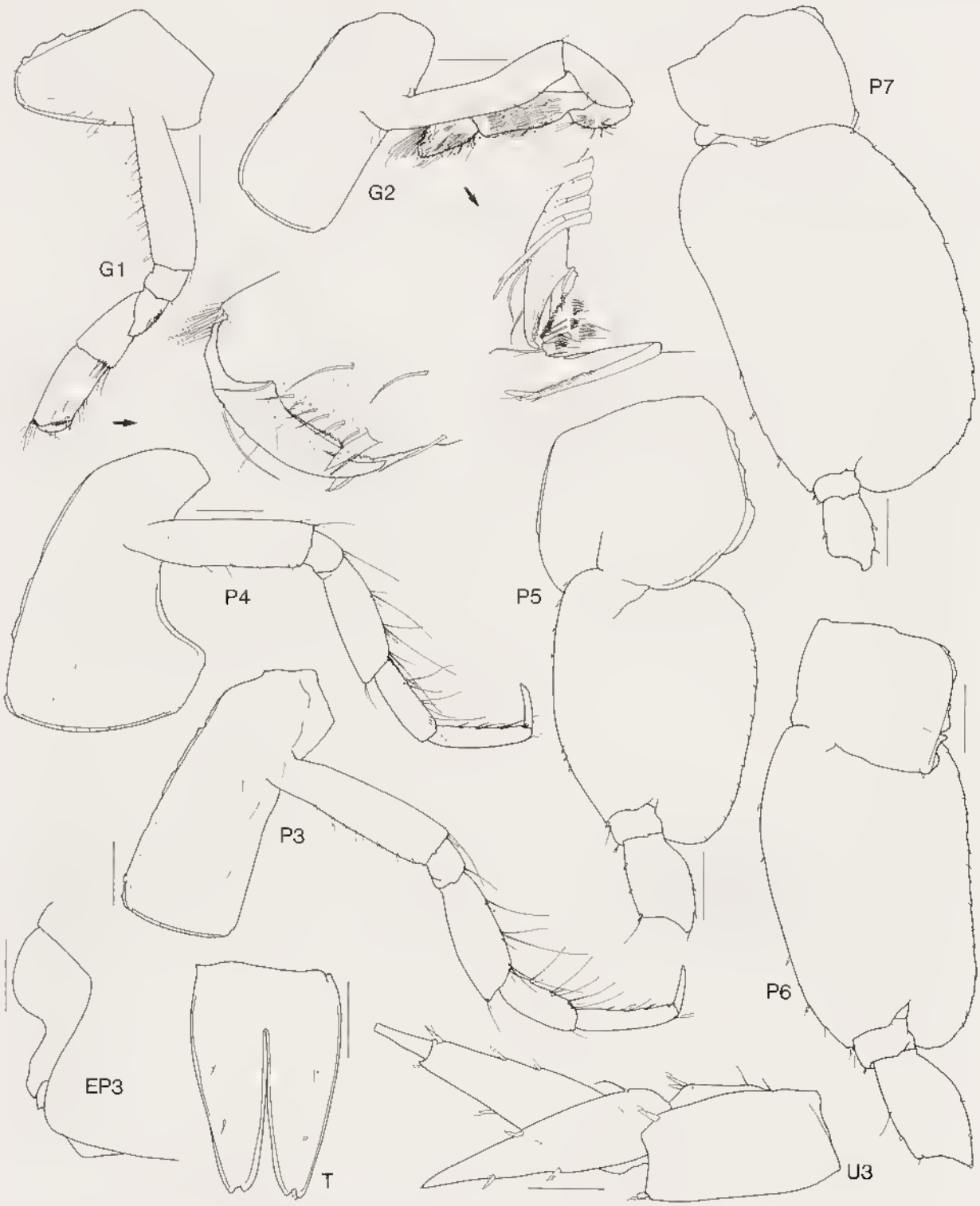

FIG. 53. — *Tryphosella oupi* sp. nov., holotype male, 5.5 mm (MNHN-Am 4381), north of the Isle of Pines, New Caledonia. Scales for U3, T represent 0.1 mm, remainder represent 0.2 mm.

Source : MNHN, Paris

Peraeopod 3 : coxa large; merus weakly expanded anteriorly, merus-carpus without plumose setae; propodus with 3 spines and 2 distal spines along posterior margin; daclylus short, slender. *Peraeopod 4* : coxa deeper than wide, with large posteroventral lobe, anterior margin slightly rounded, posterior margin slightly sloping anteriorly; merus weakly expanded anteriorly, merus-carpus without plumose setae; propodus with 3 spines and 2 distal spines along posterior margin; dactylus short, slender. *Peraeopod 5* : coxa equilobate; basis expanded with posterior margin minutely crenale; merus slightly expanded posteriorly; propodus and dactylus unknown. *Peraeopod 6* : coxa small, not lobate posteriorly; basis expanded posteriorly with minutely crenale posterior margin, without anteroventral lobe; merus slightly expanded posteriorly with 3 spines; propodus and dactylus unknown. *Peraeopod 7* : basis expanded posteriorly, posterior margin slightly rounded, minutely crenate, posteroventral corner rounded, posteroventral margin rounded; merus slightly expanded posterodistally with 2 spines; propodus and dactylus unknown.

Gills : from gnathopod 2 to peracopod 7, not pleated.

Pleonites 1 to 3 dorsally smooth. *Epimeron 3* : posteroventral corner narrowly rounded. *Urosomites* : urosomite 1 with rounded boss, without lateral flange; urosomite 3 without small dorsolateral spine. *Uropod 1* : unknown. *Uropod 2* : unknown. *Uropod 3* : peduncle well developed, short, length 1.9 times breadth, without dorsolateral flange, with 1 apicolateral and 2 apicomedial spines,without midlateral spines or setae, with 2 distoventral spines, without plumose setae; rami lanceolate, inner ramus reduced, about 0.8 times outer ramus, outer ramus 2-articulate, article 2 short, article 1 with 2 lateral and 1 medial spines; inner ramus with 1 lateral and 2 medial spines, plumose setae possibly present (broken). *Telson* : longer than broad, length 1.5 times breadth, deeply cleft (71%), without dorsal spines, with 1 dorsal seta on each lobe, distal margins incised, without marginal penicillate or simple setae, with 1 marginal spine on each lobe.

ETYMOLOGY. — Named for the Passe de Oupi through the reefs north of the Isle of Pines.

REMARKS. — For differences from *T. ana* see remarks under that species.

DISTRIBUTION. — *Tryphosella oupi* is known only from southern New Caledonia, in 825 to 860 m depth.

Genus *WALDECKIA* Chevreux, 1906

Waldeckia sp. 1

MATERIAL EXAMINED. — **Austral Isles.** SMCB, R.V. *Marara*, J.K. LOWRY and J.M. POUPIN coll.: stn FRP-1, 21°47.7'S, 154°42'W, north-east side of Maria Island, between Isle du Nordet and Isle Centrale, rubble and coarse sand samples from lagoon, 1 m, 7 August 1991 : 6 specimens (AM P42161). — Stn FRP-39, 23°19.0'S, 149°29.3'W, off Tubuai, baited trap, 485 m, 12-13 August 1991 : 1 ♀ (AM P42163). — Stn FRP-63, 27°36.55'S, 144°18.65'W, Ha'urei Bay, Rapa, baited trap on reef with large patches of brown alga, 3 m, 17-18 August 1991 : 1 juvenile (AM P42164).

REMARKS. — LOWRY & STODDART are preparing a monograph on the genus *Waldeckia*. This species will be described in that report.

Waldeckia sp. 2

MATERIAL EXAMINED. — **Chesterfield Islands.** CORAIL 2 : stn DW 4, 20°52.30'S, 161°36.56'E, Fairway Reef, between New Caledonia and Chesterfield Islands, *Halimeda* flakes, 64 m, 18 July-6 August, 1988 : 1 ♀, ovigerous (MNHN-Am 4436). — Stn DW 35, 19°21.65'S, 158°21.5'E, Chesterfield Lagoon, sand, 52 m, 18 July-6 August, 1988 : 1 ♀ (MNHN-Am 4447).

REMARKS. — LOWRY & STODDART are preparing a monograph on the genus *Waldeckia*. This species will be described in that report.

Source : MNHN, Paris

ACKNOWLEDGEMENTS

Alain CROSNIER originally encouraged us to study the amphipods from the MUSORSTOM Expeditions and arranged for LOWRY to sort the collections in Paris. Joseph POUPIN arranged for LOWRY to participate in the Austral Isles cruise aboard the RV *Marara*. We are particularly grateful to both of them for their generous hospitality, expertise and time. We thank Hans Georg ANDRES, Claude DE BROYER and Mike THURSTON who carefully and critically read and improved our manuscript; Stephen KEABLE and Kate DEMPSEY who illustrated the species and Roger SPRINGTHORPE who composed and inked the plates; and the Australian Museum Trust, the Australian Research Council and ORSTOM, who provided funds which supported the study.

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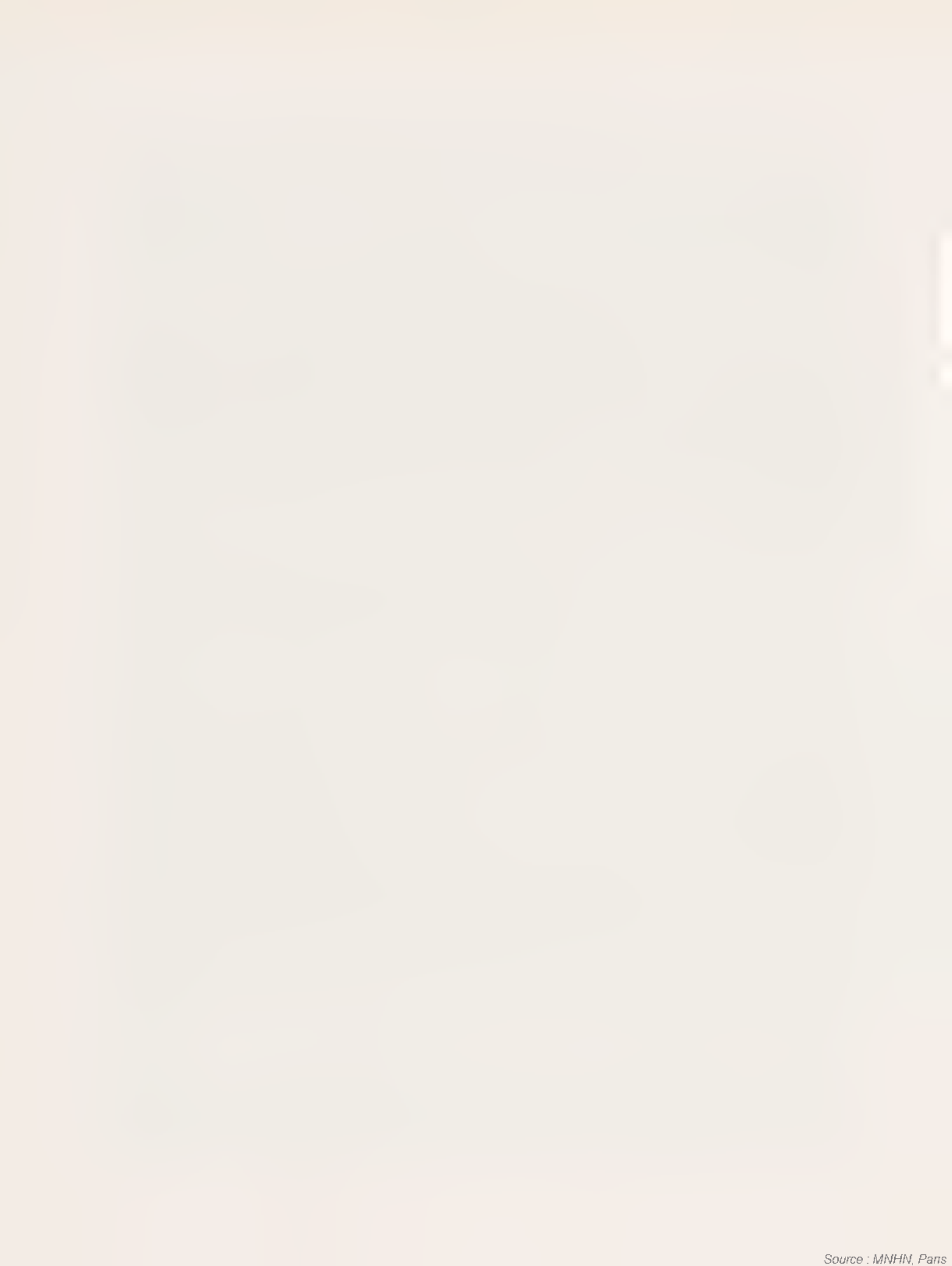

Source : MNHN, Paris

6

Crustacea Isopoda : Bopyridae in the MUSORSTOM collections from the tropical Indo-Pacific I. Subfamilies Pseudioninae (in part), Argeiinae Orbioninae, Athelginae and Entophilinae

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ABSTRACT

MUSORSTOM collections from New Caledonia, the Strait of Makassar (Indonesia), the Philippines and near Madagascar contained many new records and some new species of pseudionines from non-anomuran hosts, a new genus and species of argeiine, orbionine parasites of penaeoid shrimps, a single athelgine from 2 hosts and the only entophiline known. Species of Pseudioninae reported are *Pseudione indica* Chopra, 1930 (new to the Pacific), infesting *Plesionika narval* (Fabricius) (new host record) in the Strait of Makassar; *Ionella maculata* sp. nov. infesting *Callianassa* sp. at New Caledonia; and *Gigantione elconaxii* sp. nov., infesting *Elconaxius* sp. at New Caledonia. In the Argeiinae is *Eragia profunda*, gen. nov., sp. nov., a parasite of *Prionocrangon* sp. nov. at New Caledonia. Species of Orbioninae reported (all new geographical and host records, except as noted) are *Orbione halipori* Nierstrasz & Brender à Brandis, 1923, from the Philippines, infesting *Haliporoides sibogae* (de Man) (not a new host record); *Orbione* cf. *kempi* Chopra, 1923, from New Caledonia, infesting *Sicyonia truncata* (Kubo); *Epipenaeon fissurae* Kensley, 1974, from the Strait of Makassar, infesting *Parapenaeus longipes* Alcock (not a new host record); *Parapenaeon japonica* (Thielemann, 1910) from near the Strait of Makassar (Indonesia), infesting *Metapenaeopsis sinica* Liu & Zhong; near Panay Island, Philippines, infesting *Metapenaeopsis velutinus* (Dana); NW of Madagascar (not a new locality), infesting *Metapenaeopsis hilarula* (de Man). *Parapenaeon brevicoxalis* Bourdon, 1981, from Chesterfield Islands, infesting *Hymenopenaeus halli* Bruce, 1966; *Parapenaeon expansa* Bourdon, 1979, from the Strait of Makassar, infesting *Metapenaeopsis sinica* Liu & Zhong, from the Seychelles, infesting *Metapenaeopsis faouzii* Ramadan, from Madagascar (not a new record), infesting *Metapenaeopsis mogiensis consobrina* (Nobili), and from New Caledonia, infesting *Metapenaeopsis gaillardi* Crosnier; and *Parapenaeon secunda* Nierstrasz & Brender à Brandis, 1923, near Manila, Philippines, infesting *Metapenaeopsis palmensis* (Haswell), and the Strait of Makassar, infesting *Metapenaeopsis sinica*

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Source : MNHN, Paris

Liu & Zhong. In the Athelginae is *Pseudostegias setoensis* Shiino, 1933, from Chesterfield Islands, a new locality, where it infests a new host, *"Trizopagurus"* sp. (to be described as gen. nov., sp. nov.). In the Entophilinae, *Entophilus omnitectus* Richardson, 1903, is reported from Chesterfield Islands, a new locality, as a parasite of *Munida "incerta"* Henderson, a previously reported host. Nearly all species are illustrated and described or redescribed.

RÉSUMÉ

Crustacea Isopoda : Bopyridae des collections MUSORSTOM récoltés dans l'Indo-Pacifique tropical. I. Sous-familles Pseudioninae (en partie), Argeiinae, Orbioninae, Athelginae et Entophilinae.

Des collections MUSORSTOM faites en Nouvelle-Calédonie, dans le détroit de Makassar (Indonésie), aux Philippines et dans la région malgache, permettent de nombreuses observations nouvelles et renferment quelques espèces nouvelles de Pseudioninae trouvées sur des Crustacés non anomoures, un nouveau genre et une nouvelle espèce d'Argeiinae, plusieurs espèces d'Orbioninae parasites de crevettes pénéides, une espèce d'Athelginae trouvée sur deux espèces de pagures et le seul Entophilinae encore décrit. Les espèces de Pseudioninae, dont il est traité, sont *Pseudione indica* Chopra, 1930 (qui n'avait pas encore été signalée dans le Pacifique), récoltée sur *Plesionika narval* (nouvel hôte) dans le détroit de Makassar; *Ionella maculata* sp. nov., trouvée sur *Callianassa* sp. en Nouvelle-Calédonie, et *Gigantione elconaxii* sp. nov., trouvé sur *Elconaxius* sp. en Nouvelle-Calédonie. Dans les Argeiinae, nous décrivons *Eragia profunda*, gen. nov., sp. nov., parasite de *Prionocrangon* sp. nov. en Nouvelle-Calédonie. Les espèces d'Orbioninae examinées proviennent toutes, sauf lorsque cela est indiqué, de positions géographiques et d'hôtes nouveaux : *Orbione halipori* Nierstrasz & Brender à Brandis, 1923, des Philippines, sur *Haliporoides sibogae* (de Man) (hôte déjà connu); *Orbione* cf. *kempi* Chopra, 1923, de Nouvelle-Calédonie, sur *Sicyonia truncata* (Kubo); *Epipenaeon fissurae* Kensley, 1974, du détroit de Makassar, sur *Parapenaeus longipes* Alcock (hôte déjà connu); *Parapenaeon japonica* (Thielemann, 1910) du détroit de Makassar, sur *Metapenaeopsis sinica* Liu & Zhong, près de Panay Island, Philippines, sur *Metapenaeopsis velutinus* (Dana), du nord-ouest de Madagascar (zone déjà connue), sur *Metapenaeopsis hilarula* (de Man); *Parapenaeon brevicoxalis* Bourdon, 1981, est signalé des îles Chesterfield sur *Hymenopenaeus halli* Bruce, 1966; *Parapenaeon expansa* Bourdon, 1979, du détroit de Makassar, sur *Metapenaeopsis sinica* Liu & Zhong, des Seychelles, sur *Metapenaeopsis faouzii* Ramadan, de Madagascar (localité non nouvelle), sur *Metapenaeopsis mogiensis consobrina* (Nobili), et de Nouvelle-Calédonie, sur *Metapenaeopsis gaillardi* Crosnier; et *Parapenaeon secunda* Nierstrasz & Brender à Brandis, 1923, près de Manille, Philippines, sur *Metapenaeopsis palmensis* (Haswell), et du détroit de Makassar, sur *Metapenaeopsis sinica* Liu & Zhong. Dans les Athelginae se trouve *Pseudostegias setoensis* Shiino, 1933, des îles Chesterfield, une localité nouvelle où il a été trouvé sur un nouvel hôte, *"Trizopagurus"* sp. (espèce nouvelle qui va être l'espèce type d'un genre nouveau). Dans les Entophilinae, *Entophilus omnitectus* Richardson, 1903, est signalé des îles Chesterfield pour la première fois, trouvé sur *Munida "incerta"* Henderson, hôte sur lequel l'espèce avait déjà été signalée. Presque toutes les espèces sont illustrées, décrites ou redécrites.

The extensive collections of ORSTOM, housed in the Muséum national d'Histoire naturelle (designated MNHN), contained several uncatalogued and unidentified bopyrid isopods, parasites of many different decapod crustaceans. This report deals with a small part of that collection, with other portions to follow later.

FAMILY BOPYRIDAE Rafinesque, 1815

SUBFAMILY PSEUDIONINAE Codreanu, 1967

Pseudione indica Chopra, 1930

Fig. 1

Pseudione indica Chopra, 1930 : 115, 139-142; pl. V, fig. 1-5; text-fig. 4 [Type-locality Andaman Islands, Bay of Bengal; infesting *Pontophilus plebs* Kempl. — MARKHAM, 1985a : 14. — PAGE, 1985 : 192.

MATERIAL EXAMINED. — **Indonesia**. Strait of Makassar, CORINDON 2 : st. CH 208, 00°15'S, 117°52'E, 150 m, 31 October 1980. Infesting *Plesionika narval* (Fabricius), host det. A. CROSNIER : 1 ♀, 1 ♂.

Source : MNHN, Paris

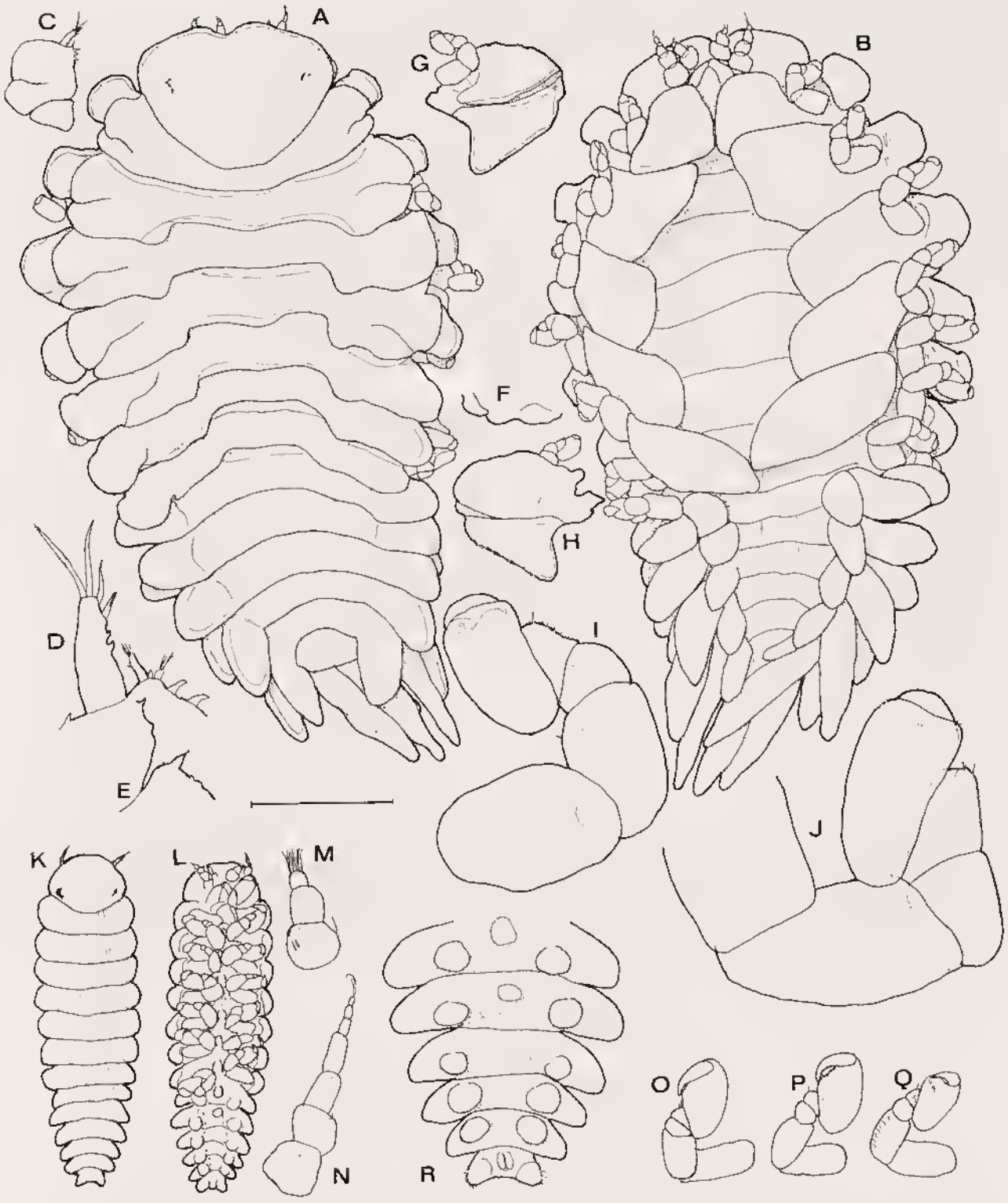

FIG. 1. — *Pseudione indica* Chopra, 1930. A-J, female, K-R; male. **A**, Dorsal view. **B**, Ventral view. **C**, Right maxilliped. **D**, Palp of same. **E**, Plectron of same. **F**, Barbula, right side. **G**, Right oostegite 1, external view. **H**, Same, internal view. **I**, Right pereopod 1. **J**. Right pereopod 7. **K**, Dorsal view. **L**, Ventral view. **M**, Right antenna 1. **N**, Right antenna 2. **O**, Right pereopod 1. **P**, Right pereopod 2. **Q**, Right pereopod 7. **R**, Pleon in ventral view.
Scale : 1.0 mm for A-C, F-H, K, L; 0.31 mm for O-R; 0.15 mm for D, E, I, J, M, N.

Source : MNHN, Paris

DESCRIPTION OF MALE. — Length 2.31 mm, maximal width 0.71 mm, head length 0.40 mm, head width 0.54 mm, pleonal length 0.71 mm. All body regions and segments distinct (Fig. 1K-L). No pigment spots except for small eyes.

Head suboval, extending well beyond front of body. Eyes as irregular streaks near posterolateral margins of head. Antennae (Fig. 1M-N) extended far beyond anterior margin of head; first of 3 articles, second of 7 articles, both setose distally, with only rare setae otherwise.

Pereon with nearly straight sides, separated laterally by only shallow indentations. Small but conspicuous midventral tubercle on each pereomere. Pereopods (Fig. 10-Q) relatively small and tightly bunched ventrally, not extending beyond sides of pereon. All articles of all pereopods distinct, dactyli and propodi of first two markedly larger than others, meri and carpi of pereopods 1 broader and shorter than others; all carpi sparsely setose distally.

Pleon (Fig. 1R) tapering slightly posteriorly, all 6 pleomeres bluntly pointed and shallowly separated laterally. Midventral tubercles on pleomeres 1 and 2 only, similar to those on pereomeres. Pleopods as 5 pairs of uniramous subcircular tubercles rising slightly from surface of pleomeres. Final pleomere broader than long, posteriorly concave, produced into swollen setose lumps posterolaterally.

DISCUSSION. — This is only the second record for *Pseudione indica*. Because its type-locality was in the eastern Indian Ocean, this find considerably extends its known range. An attempt to borrow the type-specimen, which is in the collection of the Zoological Survey of India, Calcutta, proved unsuccessful because the curator considered it too badly damaged to be lent; thus remarks on it are based on the published description. The present female, whose reduced oostegites and lack of eggs mark it as immature, shows a few differences from the holotype, the only specimen previously known. Its body is slightly less distorted, and it is proportionately a little broader (Fig. 1A-B). The anterior margin of the head is notched medially rather than anterolaterally. Its maxilliped (Fig. 1C-E) has a longer palp and, on the corner behind the palp, more slender, elaborate compound setation; the plectron is more extended. Its pereomeres are more distinctly demarcated dorsally. The present male of *P. indica* (Fig. 1K-R) is the first reported. It closely resembles the allotype of *P. cognata* Markham (1985a), except that the latter has a quadrilateral-shaped head with second antennae of only 5 articles, not 7, and its pleopods are longer.

Because the host of the types of *Pseudione indica* was a crangonid, and the present host is in the pandalid genus *Plesionika*, one might expect its parasite to be *Pseudione affinis* (G. O. Sars), which has been reported infesting 6 species of *Plesionika* around the world. This material is clearly distinct from *P. affinis*, however, thus : The female of *P. affinis* has a prominent frontal lamina, its barbula has two long projections on each side, the internal ridge of its first oostegite is ornamented, its pleopodal rami are sharply pointed rather than rounded, and its uropods are much shorter. The male of *P. affinis* has a shorter head, more rounded body and larger pleopods. Despite the differences cited, the present material belongs to *P. indica*, though it also has close similarities to *P. cognata* Markham (1985a), another parasite of a crangonid, along the coasts of Florida, U. S. A. Although most bopyrids branchially infesting carideans belong to the subfamilies Bopyrinae and Argeiinae, those found on deep-water crangonids and pandalids are often pseudionines, as in the case of these three similar species.

Ionella maculata sp. nov.

Fig. 2

MATERIAL EXAMINED. — **New Caledonia.** LAGON : stn DW 1165, 19°15.4'S, 163°19.2'E, 65 m, 30 October 1989. Infesting *Callianassa* sp., host det. M. DE SAINT.LAURENT : 1 ♀, holotype, 1 ♂, allotype (MNHN Ep-825).

DESCRIPTION. — *Holotype female* (Fig. 2A-J). Length 3.6 mm, maximal width 5.2 mm, head length 1.1 mm, pleon length 1.4 mm, distortion 8° dextrally. Body outline suboval, all body regions distinct (Fig. 2A-B). Circle of dark pigment spots near edges of dorsal surfaces of several pereomeres.

Head large, indistinctly bilobate, subtrapezoidal in outline, deeply set into pereon; no true frontal lamina, but fold resembling frontal lamina surrounding anterolateral margins and sides. Antennae minute, first pair in anterior concavity of head, second pair extending slightly forward (Fig. 2C). Eyes small, near anterolateral corners, visible

Source : MNHN, Paris

anteriorly, not dorsally (Fig. 2C). Maxilliped (Fig. 2D) of relatively large suboval anterior segment densely lined with uniformly short setae, lacking palp but slightly produced anteromedially; posterior segment markedly reduced but bearing extended plectron. Barbula (Fig. 2E) with pair of short broad projections on each side, neither subdivided, though medial one posteriorly notched.

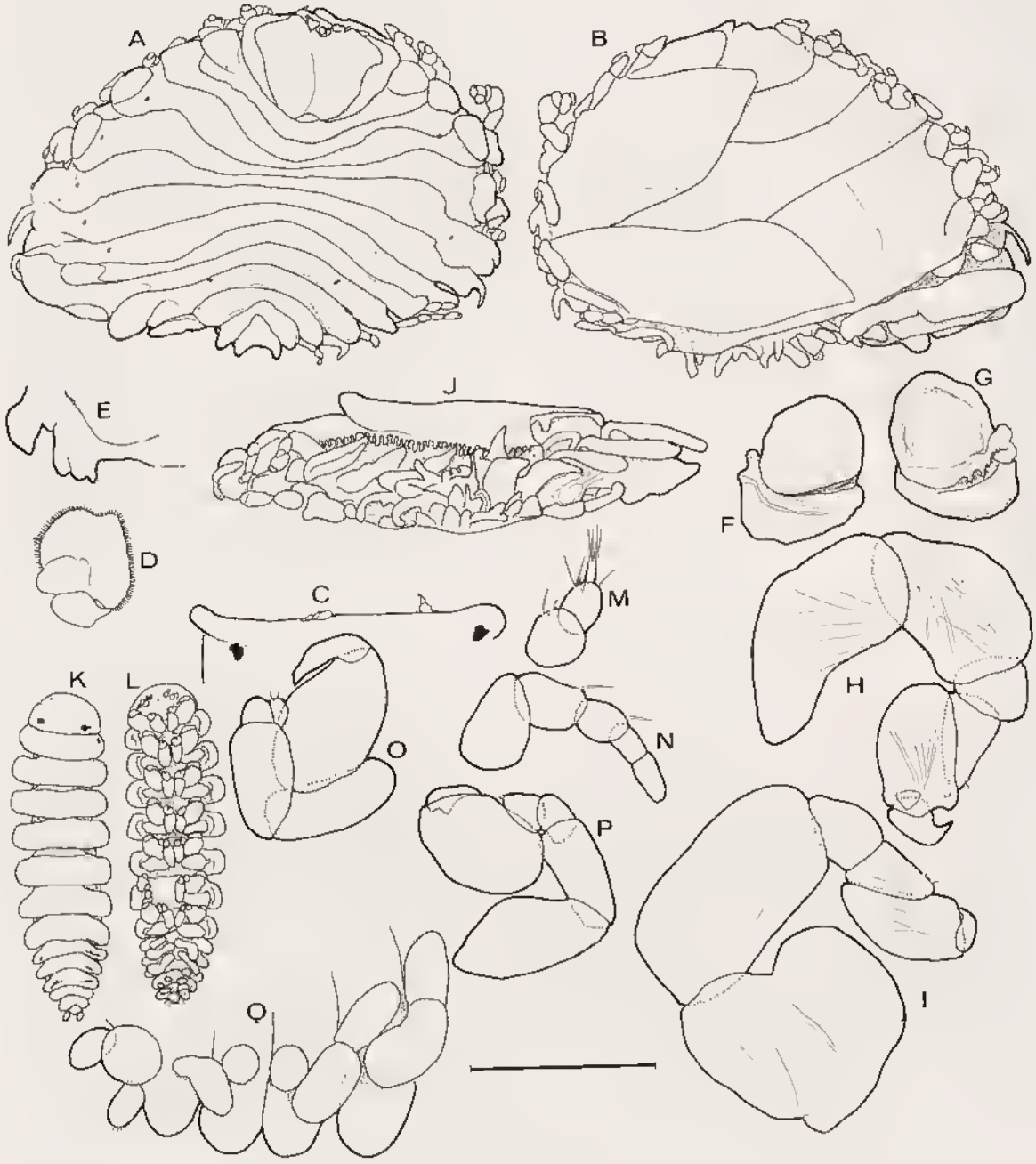

FIG. 2. — *Ionella maculata*, sp. nov. A-J, holotype female; K-Q, allotype male. **A**, Dorsal view. **B**, Ventral view. **C**, Anterodorsal margin of head. **D**, Right maxilliped. **E**, Right side of barbula. **F**, Right oostegite 1, external view. **G**, Same , internal view. **H**, Right pereopod 1. **I**, Right pereopod 7. **J**, Pleon, ventral view. **K**, Dorsal view. **L**, Ventral view. **M**, Right antenna 1. **N**, Right antenna 2. **O**, Left pereopod 1. **P**, Right pereopod 7. **Q**, Pleon, left side in ventral view.

Scale : 2.0 mm for A, B, D, F, G, K, L; 1.0 mm for C, E, J; 0.3 mm for H, I, O-Q; 0.15 mm for M, N.

Source : MNHN, Paris

Pereon broadly rounded, all pereomeres short and broad, both ends of pereon concave and enclosing both head and pleon. Coxal plates on both sides of most anterior pereomeres; pereomeres 6 and 7 produced laterally into slender falcate, posterolaterally extending projections. Large overlapping oostegites completely enclosing brood pouch; first oostegite (Fig. 2F-G) suboval, its posterior segment much broader but quite short and lacking posterolateral projection, its internal ridge digitate laterally; fifth oostegite (Fig. 2J) digitate along posterior margin. Pereopods (Fig. 2H-I) with all articles distinct, all of nearly same size and structure, though dactyli somewhat smaller and bases and ischia broader posteriorly; meri slightly setose anteriorly.

Pleon (Fig. 2J) short and ventrally mostly hidden beneath oostegites. Six pleomeres visible dorsally, not produced into lateral plates. Biramous foliate pleopods tightly bunched together, anterior ones much larger than others, especially on longer side of body, those of first 3 pairs on that side extending far laterally. Other pleopods and uniramous uropods reduced and tightly clustered beneath last oostegite.

Allotype male (Fig. 2K-Q). Length 3.44 mm, maximal width 1.04 mm, head length 0.44 mm, pleon length 0.80 mm. Slender and straight, with all segments clearly demarcated (Fig. 2K-L). Dorsal pigment spots on side of pereomere 1 and near sides of anterior pleomeres.

Head semicircular, slightly narrower than pereon. Prominent eyespots near posterolateral angles. Antennae (Fig. 2M-N) tiny, first of 3 articles, second of 5 articles, both with sparse but long setae (ends of second antennae obscured, so presence of terminal setae uncertain).

Pereon with nearly parallel sides, first and last pereomeres slightly narrower than others, all markedly separated by deep anterolateral indentations. Pereopods (Fig. 2O-P) small, all of nearly same size, with carpi distally sparsely setose; first 5 pairs with large dactyli and reduced carpi peculiarly connected to sides (not distal margins) of meri so as to touch ischia.

Pleon triangular in outline, of 6 pleomeres. All pleomeres of same length, each about half as long as any pereomere; final pleomere reduced to small knob. Pleopods 1 and 2 (Fig. 2Q) as biramous flaps; pleopods 3-5 as uniramous knobs to flaps. Uropods distally setose extended uniramous flaps.

ETYMOLOGY. — The name *maculata* (= spotted) refers to the dorsal pigment spots forming a circle on the female and those scattered on the male.

DISCUSSION. — The genus *Iouella* Bonnier contains 2 previously described species. The type-species *I. agassizi* Bonnier, 1900, which has been thoroughly described and redescribed, seems to be a fairly common parasite of *Callianassa uncinata* H. Milne Edwards along the coast of Chile (BONNIER, 1900; SHUNO, 1964; STUARDO *et al.*, 1986). *I. murchisoni* Danforth, 1970, which has been recorded only once infesting a *Callianassa* sp. in Hawaii (DANFORTH, 1970a), was, and remains, inadequately described, so its proper generic placement is uncertain. *I. maculata* illustrates the generic characters shown by *I. agassizi*, and, where known, most shown by *I. murchisoni*. Females : broadly oval, barely distorted body; proportionately broad quadrilateral head deeply inset into pereon; suboval palpless maxilliped, its anterior segment densely fringed clear around its margin by short setae and much the larger; first oostegite with large subcircular anterior segment, its internal ridge ornamented only laterally, and its posterior segment much the shorter and broader, without posterolateral point; absence of lateral plates from most pereomeres and pleomeres; posterior pereopods with wide bases and ischia; brood pouch completely enclosed by oostegites (fifth ones posteriorly fringed); first pleomere forming broadest part of body, others rapidly narrowing, with final (sixth) one small, triangular and nearly or completely set into fifth; biramous foliate pleopods tightly clustered on short pleon, anterior ones on long side greatly extended laterally and distorting general body outline; and reduced uniramous uropods. Males : extended head, complete separation of all body regions, lack of midventral tubercles, reduced pereopods, biramous anterior pleopods, and posteriorly extending uniramous uropods. All three species infest species of *Callianassa*. *I. agassizi* differs from *I. maculata* in that its female is more nearly circular, its barbula is more elaborately toothed, its maxilliped is not produced anteromedially, all of its pereomeres lack lateral plates, its pleomeres are not distinctly separated, and its final pleomere is completely embedded in the preceding one; the male of *I. agassizi* is proportionally broader, all of its pleopods are biramous, and its uropods are much smaller. The female of *I. murchisoni* has indistinctly separated pleomeres, the last of which is not extended, and has deeply digitate pleopodal rami; the male of that species is

Source : MNHN, Paris

more oval in outline, its antennae are longer, and its pleopodal rami much more separated and extended. Inclusion of *I. maculata* in *Ionella* produces two slight exceptions to the original generic diagnosis because the female has lateral plates on two percomeres, and only the first two pleopods of the male are biramous; the necessary resultant modifications of the diagnosis are not serious, especially in light of the other extensive consistency of characters of the species listed above.

Damage prevented specific identification of the host, so it is unknown whether this species of *Callianassa* is previously known as a bopyrid host.

Gigantione elconaxii, sp. nov.

Figs 3-4

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL : stn. CP 290, 20°36.91'S, 167°03.34'E, 920-760 m, 27 April 1987. Infesting *Elconaxius* sp., host (damaged) det. M. DE SAINT LAURENT : 1 ♀, holotype, 1 ♂, allotype (MNHN Ep-820).

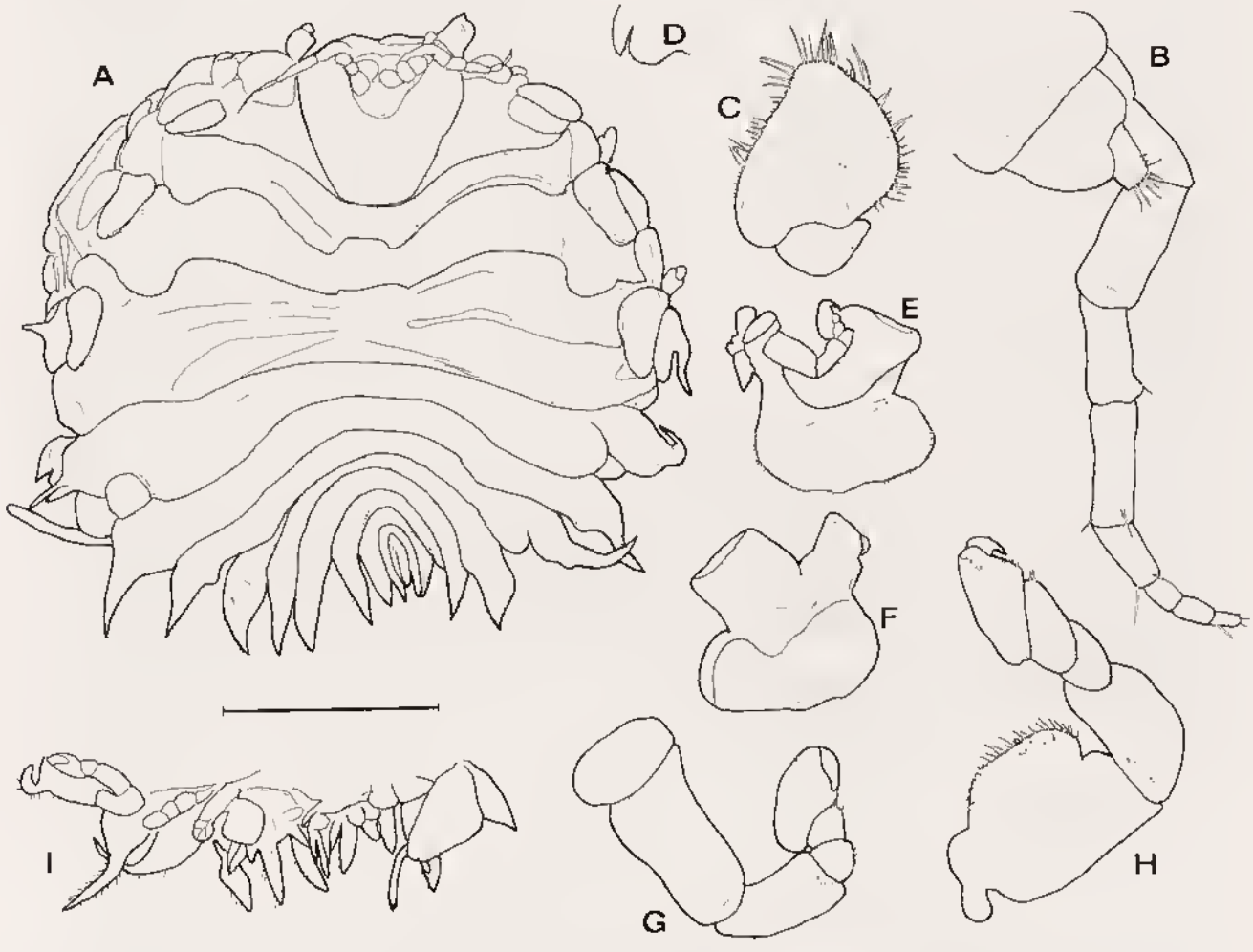

FIG. 3. — *Gigantione elconaxii*, sp. nov., holotype female. **A**, Dorsal view. **B**, Right antennae. **C**, Left maxilliped. **D**, Right side of barbula. **E**, Right oostegite 1, external view. **F**, Same, internal view. **G**, Right pereopod 1. **H**, Right pereopod 7. **I**, Pleon in ventral view.

Scale : 1.00 mm for A, D, E, F, I; 1.80 mm for C; 0.35 mm for G, H; 0.18 mm for B.

Source : MNHN, Paris

DESCRIPTION. — Holotype female (Fig. 3). Length 2.8 mm, maximal width 3.2 mm, head length 0.9 mm, pleon length 0.6 mm, distortion 19° dextrally. Body outline suboval, all body regions distinct (Fig. 3A-B). No pigment spots.

Head large and deeply set into pereon, trapezoidal in outline, bisecting first pereomere dorsally. Antennae (Fig. 3B) arising from deep anterior concavity; first one of 3 articles, of which 2 proximal ones very broad; second antenna of 8 articles, extending far beyond margin of head, both sparsely setose on distal ends of some articles. Maxilliped (Fig. 3C) suboval, lacking palp, anterior article much larger than posterior one and lined with fringe of long setae. Barbula (Fig. 3D) with 2 short simple projections on each side, lateral one much narrower than medial one.

Pereon broadest across pereomere 4, that also longest pereomere. Pereon encircling both head and pleon. Dorsolateral bosses on both sides of pereomeres 1-4; pereomeres 4-7 produced into slender curved points. Oostegite 1 (Fig. 3E-F) as broad as long, with entire internal ridge, no posterolateral projection, posterior border fringed by tiny setae. Pereopods (Fig. 3G-H) relatively small, all of about same size, though bases broader posteriorly; articles variously setose.

Pleon short, with anterior pleomeres overreaching posterior ones. All pleomeres except last (sixth) produced into sharp extended lateral plates. Pleomere 6 long and slender, deeply embedded into pleomere 5. Pleopods (Fig. 3I) reduced to irregular biramous flaps tightly bunched behind brood pouch. Uropods, visible only in ventral view, biramous, each ramus extending posteriorly as small lanceolate flap.

Allotype male (Fig. 4). Length 1.89 mm, maximal width 0.86 mm, head length 0.39 mm, pleon length 0.45 mm. Body tapering toward both ends, with all segments clearly demarcated (Fig. 4A). No pigment spots.

Head quadrilateral, prominently extended from pereon. No eyes. Antennae (Fig. 4B) both very similar to those of female in structure, size, setation and great lateral extension from sides of head, except antenna 2 of more (11) articles.

Pereon broadest across pereomere 5, sides of pereomeres only moderately separated. Pereopods (Fig. 4C-D) reduced, not reaching beyond sides of body, all of about same size; all dactyli long and propodi broad relative to other articles.

Pleon of 6 pleomeres, all much shorter than pereomeres; last pleomere barely extending beyond fifth; lateral margins of most pleomeres setose. Five uniramous pleopods as small flaps to knobs. Uniramous uropods similar to pleopods but larger; no appendages extending to margins of pleon.

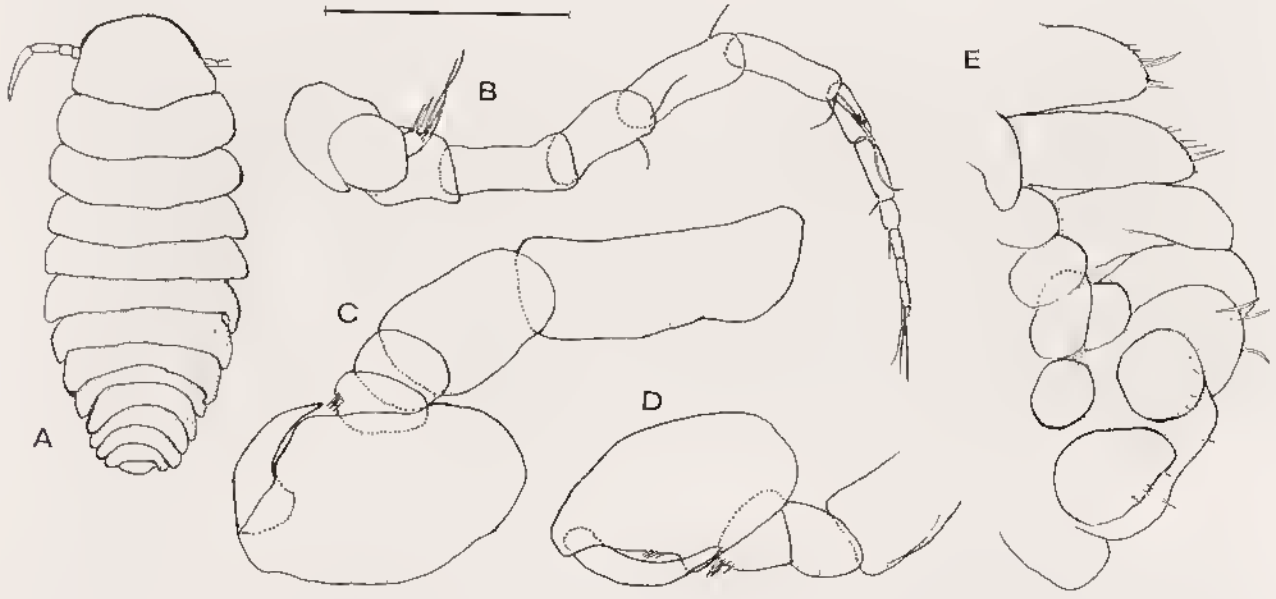

FIG. 4. — *Gigantione elconaxii*, sp. nov., allotype male. A, Dorsal view. B, Left antennae. C, Left pereopod 1. D, Right pereopod 7. E, Left margin of pleon in ventral view.
Scale : 1.00 mm for A; 0.18 mm for B-E.

Source : MNHN, Paris

ETYMOLOGY. — The name *elconaxii* is the genitive of the generic name of its host, in the axiid genus *Elconaxius*.

DISCUSSION. — So far, 11 species of *Gigantione* have been described, but some remain poorly known. The female of *G. elconaxii* differs from all other species by having a relatively narrow trapezoidal (rather than rectangular or suboval) head, which bisects the first pereomere and bears dorsally placed antennae; its male differs from other species in having very long second antennae, in being more oval, with its pereomeres less separated and its pleopods shorter and its uropods less extended. The females of the other species differ thus : *G. bouvieri* Bonnier, 1900, as redescribed by MONOD (1932), has a more extended head, broader lateral extensions on the longer side of the pereon and much more conspicuous uropods; *G. giardi* Nobili (1906), as described by NOBILI (1907), has a more extended head and uropods, a more elaborate internal ridge on the first oostegite and digitate-margined pleonal lateral plates; *G. hawaiiensis* Danforth, 1970 (as described without name by DANFORTH, 1963), differs the same ways as *G. bouvieri*; *G. ishigakiensis* Shiino (1941) and *G. moebii* Kossmann (1881), which may be synonyms, have more extended heads, longer but less sharply tapered coxal plates and lateral plates and more prominent uropods; *G. mortenseni* Adkison (1984), the only species known from a large series, has a conspicuous frontal lamina, longer coxal plates and more prominent uropods; *G. pikei* Page (1985) is subrectangular with all segmentation obscure and uropods conspicuous but not at all extended; *G. pratti* Danforth (1967) has an extended head with small antennae and a posteriorly distorted body; *G. rathbunae* Stebbing (1910) is similar to *G. bouvieri*; *G. saganiensis* Shiino (1958) and *G. uberlackerae* Adkison (1984), which are similar, have longer coxal plates and more extended final pleomeres and uropods. This is the first record of bopyrid infestation of any species of *Elconaxius*, though species in 3 other axiid genera are known as hosts.

The two genera considered here, *Gigantione* Kossmann, 1881, and *Ionella* Bonnier, 1900, are difficult to distinguish. The problem of generic definition was aggravated by the very inadequate description of the type-species of *Gigantione*, *G. moebii* by KOSSMANN (1881), a parasite of a xanthid crab on Mauritius. *G. moebii* was not reported again until BOURDON (1969) published an account of additional material from another xanthid in Mauritius and presented the first proper description. BONNIER (1900) stated that "Deux caractères suffisent à caractériser ce genre : la femelle adulte possède des lames pleurales sur tous les somites, tant ceux du thorax que ceux de l'abdomen, et ses uropodes sont biramés." Without referring to *Gigantione*, BONNIER (1900) diagnosed *Ionella* : "Ce genre...est nettement caractérisé par l'absence des lames pleurales sur les somites du pléon, par les uropodes simples et enfin par les pléopodes qui sont biramés, non seulement dans le sexe femelle, mais aussi dans le sexe mâle..." The two genera are evidently closely related. Females of both are only slightly distorted, their bodies are at least as wide as long, their large heads are deeply inset, their palpless maxillipeds are densely setose; some of their pereopods are produced into sharp points; and their pleonal appendages are reduced and tightly bunched ventrally. The males are more different, but both have distinct segmentation, extended heads, six pleomeres and conspicuous flaplike pleopods. Females of *Ionella* have reduced antennae, pleons distorted to one side with pleopods on that side much enlarged and uniramous uropods; those of *Gigantione* have very long antennae, symmetrical pleons and biramous uropods. Males of *Ionella* have most or all pleopods biramous, while males of *Gigantione* have variable pleopods. Known hosts of *Ionella* spp. are all species of *Callianassa*; reported hosts of *Gigantione* spp. are brachyurans except for three in the thalassinidean family Axiidae (two *Axiopsis* spp. and an *Elconaxius*).

SUBFAMILY ARGEIINAE Markham, 1977

Genus *ERAGIA* nov.

DIAGNOSIS. — Female : Body only slightly distorted. Quadrilateral head embedded in pereon, bearing very reduced frontal lamina; maxilliped with anterior article about twice size of posterior one, articulating palp small. Pereon suboval, broader than long; some anterior dorsolateral bosses weakly developed; first oostegite with nearly unornamented internal ridge and very slender posterolateral projection; pereopods 1 and 2 much smaller than others.

Source : MNHN, Paris

close to head; pereopod 3 or pereopods 3 and 4 on sides of body; other pereopods aligned behind brood pouch. Pleon, of 6 pleomeres, greatly extended, with ends of long lateral plates forming nearly parallel sides; 5 pairs of uniramous pleopods as tiny knobs; structure of uropods ambiguous. Male : Unknown. Host : In crangonid genus *Prionocrangon*.

ETYMOLOGY. — *Eragia* is an anagram of the generic names *Argeia* and *Gareia*, applied to previously described genera of the subfamily Argeiinae. Gender feminine.

TYPE-SPECIES. — By present designation, *Eragia profunda* sp. nov.

Eragia profunda sp. nov.

Fig. 5

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn. CP 72, 22°10'S, 167°33'E, 2100-2110 m, 4 September 1985, infesting *Prionocrangon* sp. nov., host det. L. B. HOLTHUIS, 1 ♀, holotype (MNHN-Ep-829).

DESCRIPTION. — Holotype female (Fig. 5). Length 4.60 mm, maximal width 4.67 mm, head length 0.95 mm, pleonal length 2.12mm. All body regions separated, head embedded in oval pereon, but pleon greatly extended posteriorly (Fig. 5A), making body key-shape overall.

Head trapezoidal, much wider than long, bearing very reduced frontal lamina anterodorsally. No eyes. Antennae (Fig. 5B-C) reduced, first one of 3 articles, second of 4 articles, each antenna with sparse terminal setae. Maxilliped (Fig. 5D-F) suboval, anterior article about twice as long as posterior one; short broad articulating setose palp on anterior margin of maxilliped, not reaching most anterior part of maxilliped. Barbula (Fig. 5G) with 2 small falcate projections on each side.

Pereon oval, much broader than long, pereomeres 1-3 only obscurely separated, and pereomere 7 concealed dorsally beneath pleon. Coxal plates slightly developed on pereomere 1. Indistinct dorsolateral bosses on both sides of pereomeres 1-3. Oostegites completely surrounding brood pouch but not fully covering it; oostegite 1 (Fig. 5H-I) broadly rounded, each plate equally long, with internal ridge unornamented except for single clubtike process laterally, slender falcate posterolateral projection; fifth ooslegites with some long setae posteriorly. Pereopods 1 and 2 (Fig. 5J) tiny, close beside head on anterior margin of pereon; pereopods 3-7 (Fig. 5K) much larger, third pereopod or third and fourth pereopods on sides of body, others (Fig. 5L) in nearly straight line across body just behind brood pouch.

Pleon (Fig. 5L) greatly extended posteriorly. Six pleomeres, first one very short, second somewhat longer, next three all slightly longer than second, sixth longest. All pleomeres, including final one, produced into long blunt, laterally extending, nontapering lateral plates; ends of lateral plates 2-5 making sides of pleon nearly parallel. Five pairs of reduced uniramous claviform pleopods. Sixth pleomere bearing peculiar central structure, either long anal cone or unpaired uropod.

Male : Unknown.

ETYMOLOGY. — The Latin word *profunda*, meaning "deep", reflects the collection of this species at a depth of more than 2000 m, one of the deepest records for any species of bopyrid.

DISCUSSION. — The single female is evidently somewhat immature and the male unknown, so much remains unrecorded about this species. Nonetheless, it clearly shows characters excluding it from any previously described genus. The female is placed in the Subfamily Argeiinae (see MARKHAM, 1977) because of its broad short embedded quadrilateral head with a reduced frontal lamina; the shape and proportions of its maxilliped and the size and placement of its palp; its open brood pouch and first oostegite with simple internal ridge; the pleon of 6 pleomeres produced into blunt lateral plates and bearing reduced uniramous claviform pleopods; and its host in the caridean family Crangonidae. The female differs from those of other argeiines (those considered by MARKHAM, 1977, and the monotypic genus *Gareia* described by BOURDON & BRUCE, 1983), most conspicuously by its unique

Source : MNHN, Paris

key-shaped body outline caused by the peculiar extension of the pleon and by the arrangement and size differential of its pereopods. For these reasons it is placed in a new genus.

This is the first record of bopyrid infestation of any species of the deep-water crangonid genus *Prionocrangon*. Although the host has been identified as a new species, it is unknown when it may be described.

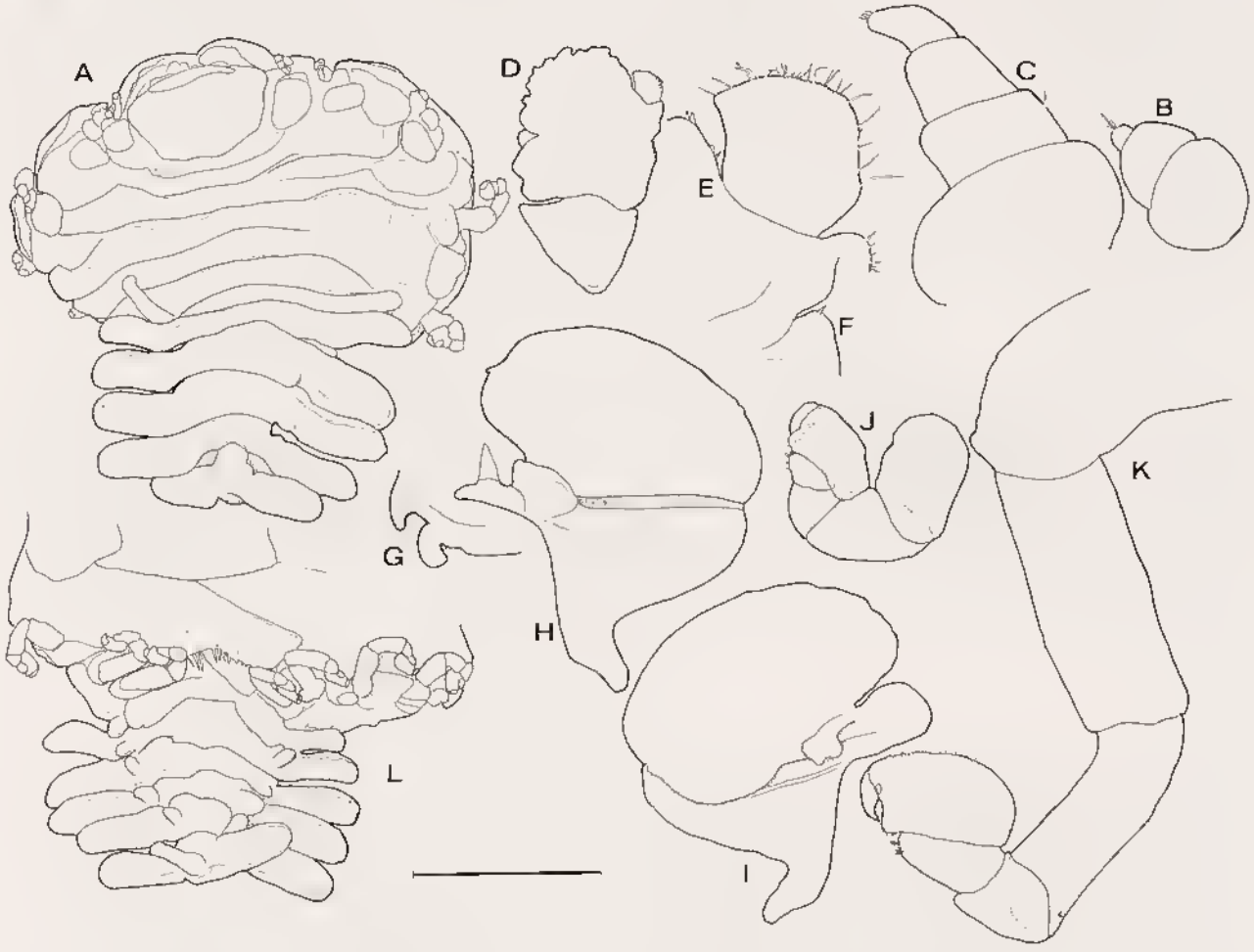

FIG. 5. — *Eragia profunda* gen. nov., sp. nov., holotype female. **A**, Dorsal view. **B**, Right antenna 1. **C**, Right antenna 2. **D**, Maxilliped. **E**, Palp of same. **F**, Plectron of same. **G**, Right side of barbula. **H**, Right oostegite 1, external view. **I**, Same, internal view. **J**, Right pereopod 1. **K**, Right pereopod 7. **L**, Posterior pereopods and pleon in ventral view.

Scale : 2.0 mm for A, L; 1.0 mm for D, G-I; 0.35 mm for J, K; 0.18 mm for B, C, E, F.

SUBFAMILY ORBIONINAE Codreanu, 1967

Orbione halipori Nierstrasz & Brender à Brandis, 1923

Fig. 6

Orbione halipori Nierstrasz & Brender à Brandis, 1923 : 64-66, fig. 2a-h [Paternoster and Kei Islands, Indonesia, infesting *Haliporus sibogae* (de Man) = *Haliporoides sibogae* (de Man)]. — DAKIN, 1931 : 270. — SHIINO, 1949 : 52, 55; 1952 : 38; 1958 : 53-55, fig. 14 [off Owase, Mie Prefecture, Japan, infesting *Parahaliporus sibogae* (de Man) = *Haliporoides sibogae*]; 1972 : 8. — BOURDON, 1979a : 471-477, 480, figs 1-3 [Madagascar, infesting *H. sibogae*

Source : MNHN, Paris

madagascariensis Crosnier and *Hymenopenaeus halli* Bruce]; 1979c : 431 [Reexamination of types; also Lorenzo Marques, infesting *Hymenopenaeus triarthrus* (Stebbing); and Sydney, Australia, infesting *Aristaeomorpha foliacea* Risso; incorporation of *O. halipori* var. *libera* and *O. natalensis* into *O. halipori*]; 1982 : 195. — MARKHAM, 1982 : 362-365, 385, figs 21, 22 [Hong Kong, infesting *Metapenaeus ensis* (de Haan)]; 1986 : 144, 159, fig. 1I. — OWENS & GLAZEBROOK, 1985 : 107, table 2 [Gulf of Carpentaria, Australia, infesting *M. ensis*]. — PAGE, 1985 : 208. — MORTON, 1988 : 94, 95, 118, pl. 3t.

Crassione aristaei Dakin, 1931 : 268-272, text-figs 1-9, pl. XIV [Off New South Wales, Australia, infesting *Aristeus foliaceus* (Risso) = *Aristaeomorpha foliacea* (Risso)].

Orbione halipori var. *libera* Nierstrasz & Brender à Brandis, 1931 : 155 [Off Wain, Moluccas, Indonesia, infesting host subsequently identified as *Hymenopenaeus lucasii* (Bate)]. — SHIINO, 1949 : 52, 55; 1965 : 463, fig. 1. — BOURDON, 1972 : 107.

Orbione natalensis Carton, 1970 : 47 [Nomen nudum. Mozambique Channel, infesting *Hymenopenaeus triarthrus* (Stebbing) = *Haliporoides triarthrus* Stebbing].

Orbione natalensis Bourdon, 1972 : 104-107; figs.3-6 [Near Natal, South Africa, infesting *H. triarthrus*].

Non *Orbione halipori libera* Shiino, 1934 : 258-260, fig. 1 [Tanabe Bay, Japan, infesting *Solenocera distincta* (de Haan); description]; 1972 : 8. — BOURDON, 1981 : 242 [excluded from species].

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 2 : stn 83 : 13°55.2'N, 120°30.5'E, 320-318 m, 2 December 1980. Infesting *Haliporoides sibogae* (de Man), det. of host A. CROSNIER : 4 ♀, 4 ♂ (MNHN-Ep 821).

DISCUSSION. — *Orbione halipori* has been described and redescribed in such thorough detail that it would be superfluous to add anything here. The greatly enlarged and medially arching coxal plates on the first 2 pereomeres of the female, with their fringed edges, are very distinctive. In the present material, the other 3 females have more prominent coxal plates on the long sides of pereomeres 3-7, and one also has a noticeably smaller maxilliped. Three of the present females are sinistral, only one dextral. This is the first record of *O. halipori* from the Philippines, but the host is the same recorded for the types in Indonesia.

Orbione cf. *kempi* Chopra, 1923

Fig. 7

Orbione kempi Chopra, 1923 : 416, 419, 446, 447-451, text-fig. 4, pl. XII, figs 1-5 [Bay of Bengal, infesting *Sicyonia bispinosa* de Haan]. — SHIINO, 1949 : 52, 55. — BOURDON, 1981 : 243. — DEVI, 1987 : 23, 28, 31, table 1 [Kakinada, India, infesting *Metapenaeus brevicornis* H. Milne Edwards and *M. lysianassa* (de Man)].

«*Orbione*» *kempi* - BOURDON, 1981 : 243; table 1 [Questioning of generic status].

MATERIAL EXAMINED. — **New Caledonia.** SMIB 4 : stn DW 68, Norfolk Ridge, 22°55.0'S, 167°16.0'E, 440 m, 10 March 1989. Infesting *Sicyonia truncata* (Kubo), host det. A. CROSNIER : 1 ♀, 1 ♂ (MNHN-Ep 815).

DISCUSSION. — The present material differs from the type material of *Orbione kempi* of CHOPRA (1923) in a few respects, and it is not fully certain that it is assignable to it. To indicate that further material may prove that it is actually an undescribed species, I have reported it as *Orbione* cf. *kempi*. The original description was based on a single pair, and that is all that is present here, so the range of variability in *O. kempi* is uncertain. This female is slightly more distorted, the projections on its barbula less extended, the posterolateral projections on its first oostegites slightly longer and narrower, and its uropods less extended. (The peculiar extension and division of the lateral plate on the left side of pleomere 1 are probably an individual anomaly.) The body proportions, frontal lamina, shape and palp of the maxilliped, coxal plates, sizes and basal enlargements of the pereopods and structure of the pleonal appendages all conform with those of the types. Although some details of the type male are uncertain, the present male seems to agree with it in most characters, except that its second antennae have four articles, not three, and the dactyli of its pereopods become somewhat smaller posteriorly. Like the types, this material infests a species of *Sicyonia*, assigned to *S. truncata*, a new specific record. New Caledonia is a new locality record for *O. kempi*.

Source : MNHN, Paris

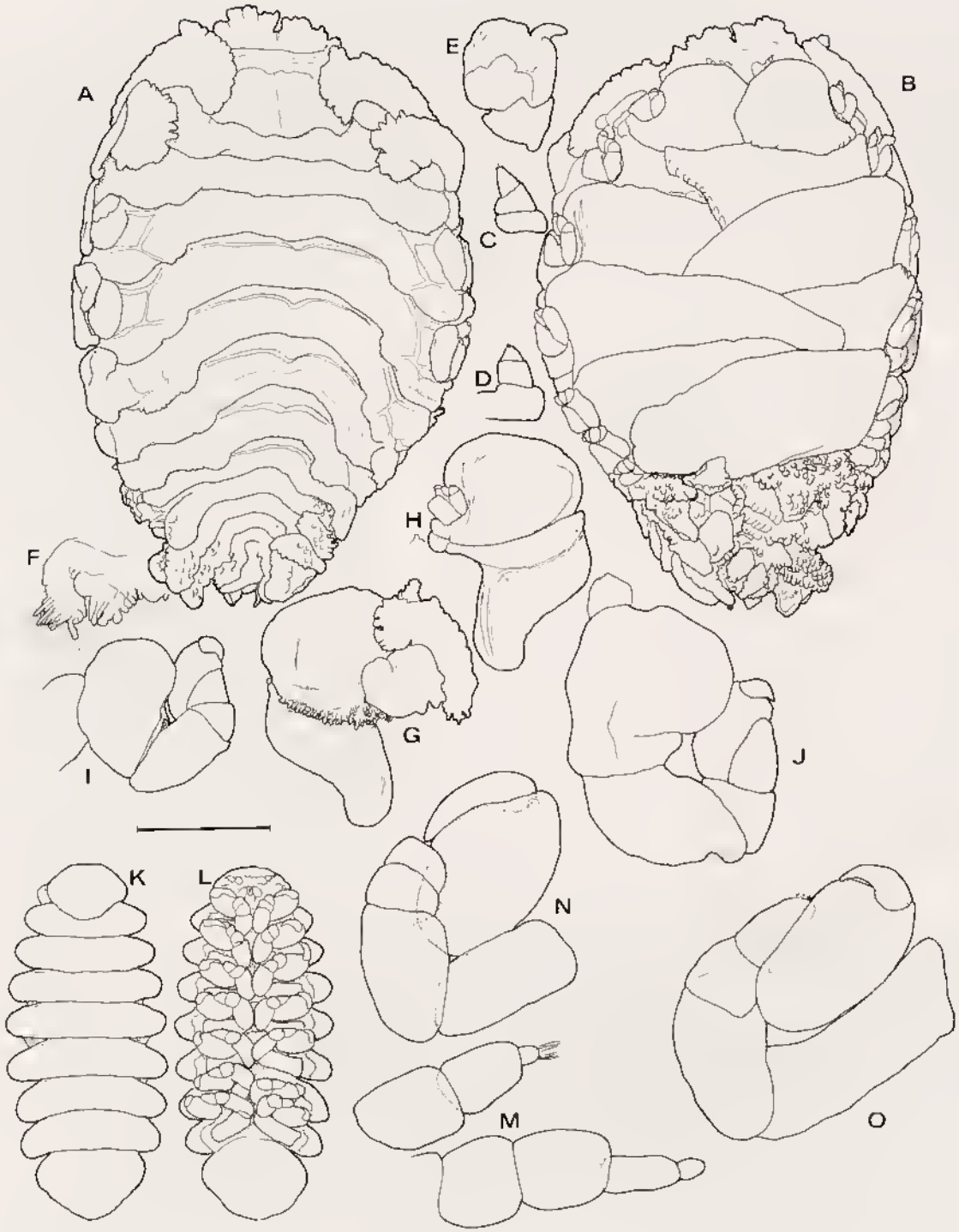

FIG. 6. — *Orbione halipori* Nierstrasz & Brender à Brandis, 1923. A-J, female. K-O, male. **A**, Dorsal view. **B**, Ventral view. **C**, Right antenna 1. **D**, Right antenna 2. **E**, right maxilliped. **F**, Right side of barbula. **G**, Right oostegite 1 and coxal plate, external view. **H**, Same, internal view. **I**, Right pereopod 1. **J**, Right pereopod 7. **K**, Dorsal view. **L**, Ventral view. **M**, Right antennae. **N**, Left pereopod 1. **O**, Left pereopod 7.

Scale : 4.00 mm for A, B; 0.96 mm for C, D, I, J; 1.92 mm for E-H, K, L; 0.15 mm for M; 0.30 mm for N, O.

Source : MNHN, Paris

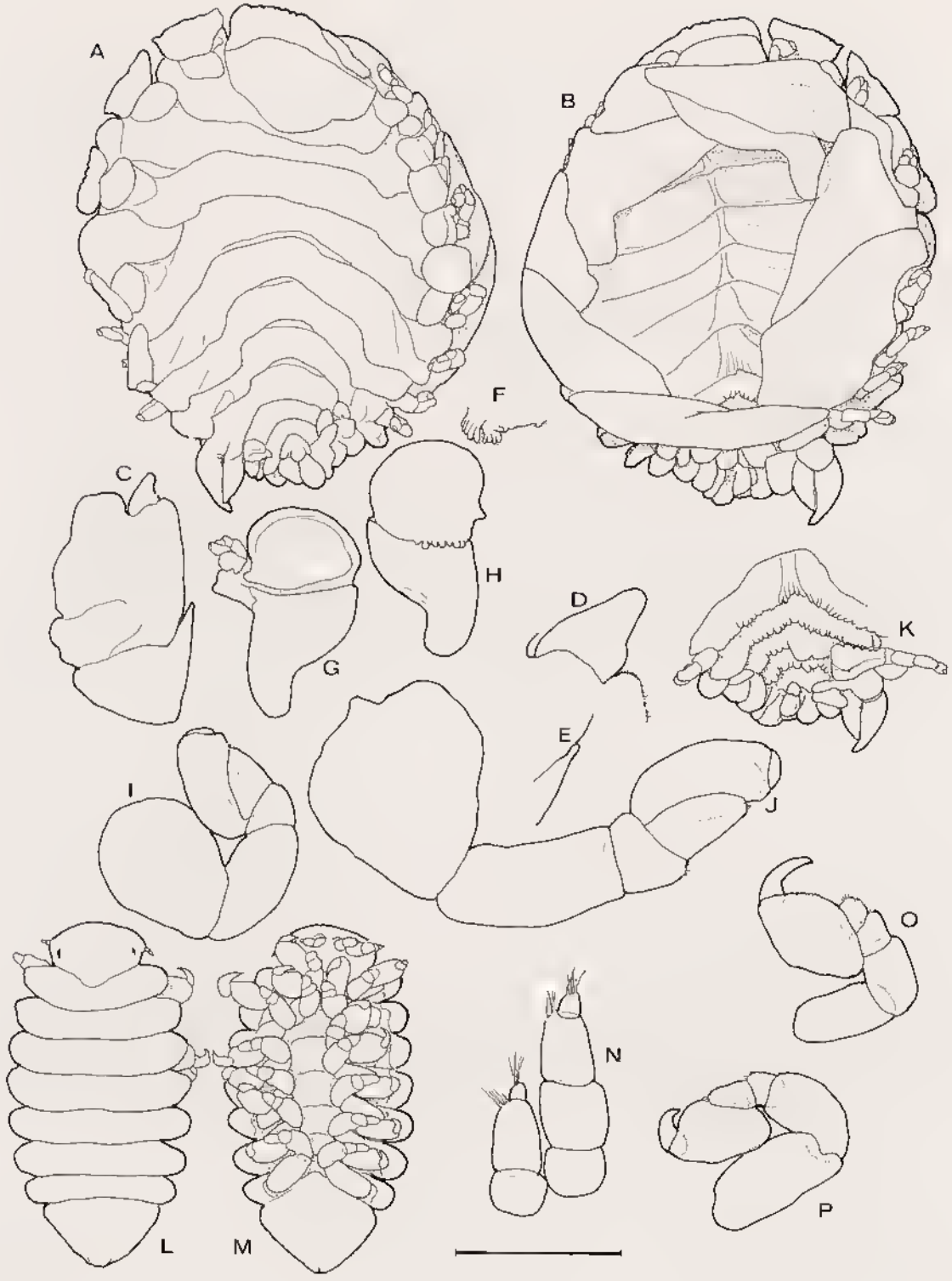

FIG. 7. — *Orbione* cf. *kempi* Chopra, 1923. A-K, female; L-P, male. **A**, Dorsal view. **B**, Ventral view. **C**, Left maxilliped. **D**, Palp of same. **E**, Plectron of same. **F**, Right side of barbula. **G**, Right oostegite 1, external view. **H**, Same, internal view. **I**, Right pereopod 1. **J**, Right pereopod 7. **K**, Pleon in ventral view. **L**, Dorsal view. **M**, Ventral view. **N**, Left antennae. **O**, Right pereopod 1. **P**, Right pereopod 7.

Scale : 1.00 mm for A, B, F-H, K; 0.50 mm for C, L, M; 0.31 mm for D, E, I, J, O, P; 0.15 mm for N.

Source : MNHN, Paris

Epipenaeon fissurae Kensley, 1974

Figs 8-9

Epipenaeon fissurae Kensley, 1974 : 261-263, fig. 2a-j [Off Natal, South Africa, infesting *Parapenaeus fissurus* Bate]; 1978 : 152, 153; fig. 67F-G. — Bourdon, 1979a : 498-501, figs 19-20 [Near Madagascar, infesting *P. fissurus*; redescription]; 1979c : 428 [Bay of Bengal, infesting *P. longipes* Alcock]; 1981 : 239, 242, 255, 259-260 [unspecified locality in Philippines, infesting unidentified penaeid]. — Nearhos & Lester, 1984 : 258.

Material examined. — **Indonesia**. Strait of Makassar. Corindon 2 : stn 205, 01°05.0'S, 117°45.2'E, 85-79 m, fish trawl, 30 October 1980 : 7 ♀, 6 ♂ (MNHN Ep-827). — Stn 295, 01°26.5'S, 117°02.1'E, 54-51 m, fish trawl, 11 November 1980 : 4 ♀, 3 ♂ (of which 1 ♀ and 1 ♂ drawn) (MNHN Ep-826). All infesting *Parapenaeus longipes* Alcock, hosts det. A. Crosnier.

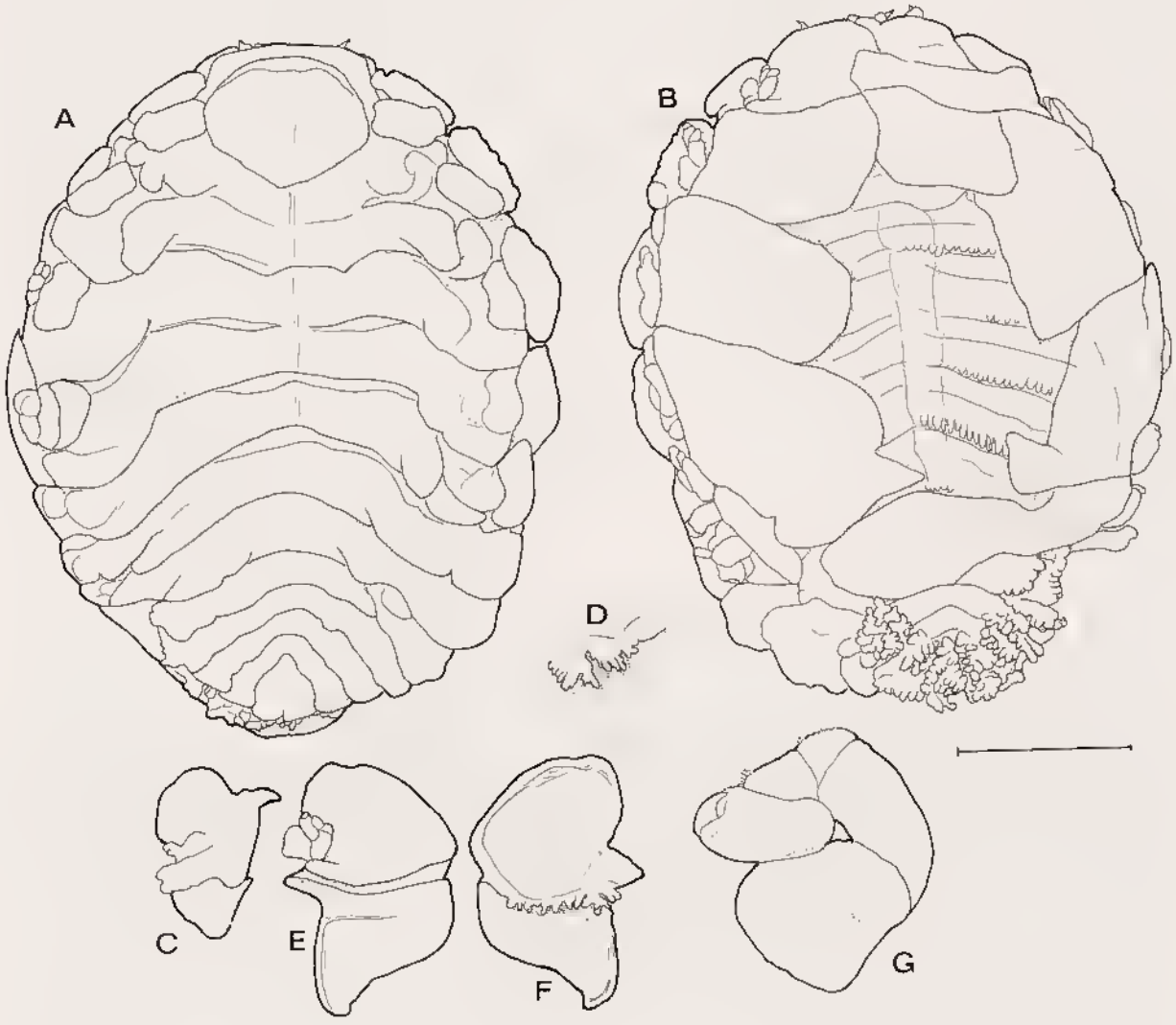

Fig. 8. — *Epipenaeon fissurae* Kensley, 1974, female. **A**, Dorsal view. **B**, Ventral view. **C**, Right maxilliped. **D**, Right side of barbula. **E**, Right oostegite 1, external view. **F**, Same, internal view. **G**, Left pereopod 1.
Scale : 2.0 mm for A, B; 0.3 mm for C-F.

Discussion. — Diagnostic characters for *E. fissurae*, as described and illustrated by Kensley (1974) and Bourdon (1979a), are, for the female, the shape of the head (Fig 8A), the angled nonarticulating maxilliped palp

Source : MNHN, Paris

(Fig. 8C), the deeply digitate processes on the barbula (Fig. 8D), the elaborate internal ridge of the first oostegite (Fig. 8F), the tuberculate pleopods (Fig. 8B) and the notched final pleomere (Fig. 8A); and, for the male, the shape and proportions of the body regions (Fig. 9A) and pereopods 1 and 2 with larger dactyli and shorter meri and carpi than in the other 5 pereopods. The specimens previously illustrated are quite similar to each other, but where they differ, the present material is more similar to that of BOURDON (1979a). The female illustrated has a slightly more slender posterolateral projection on the first oostegite and a posterior pleon notch of length intermediate between those previously illustrated. The male illustrated lacks eyes. Of the females examined, three are dextral and eight sinistral. *Parapenaeon longipes* is not a new host record for *Epipenaeon fissurae*, but Strait of Makassar is a new locality.

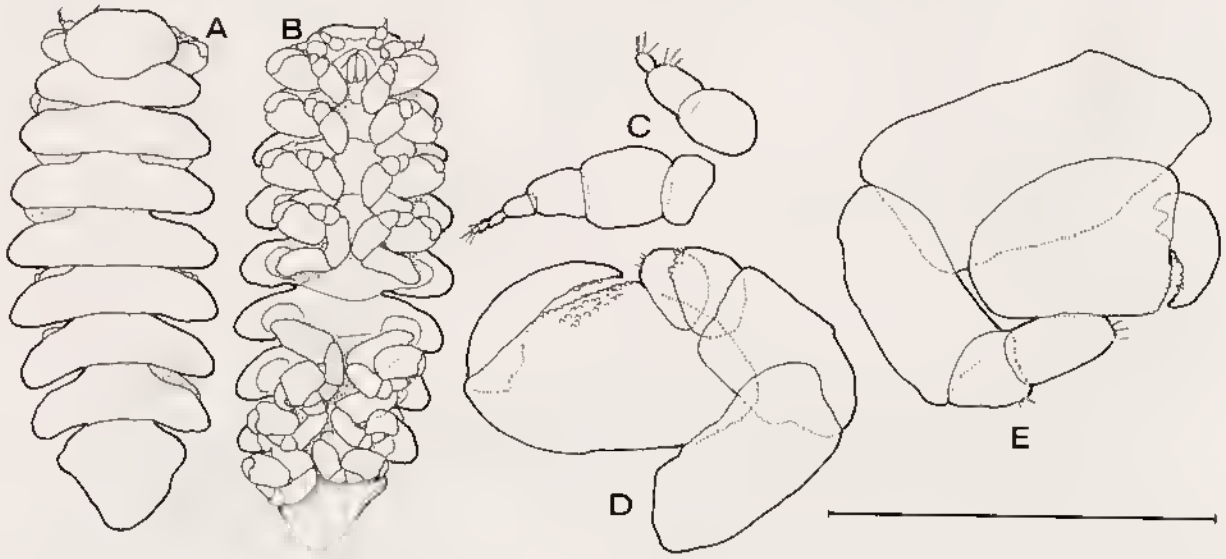

FIG. 9. — *Epipenaeon fissurae* Kensley, 1974, male. **A**, Dorsal view. **B**, Ventral view. **C**, Right antennae. **D**, Left pereopod 1. **E**, Left pereopod 7.
Scale : 2.0 mm for A, B; 0.3 mm for C-E.

Parapenaeon japonica (Thielemann, 1910)

Figs 10-11

Epipenaeon japonica Thielemann, 1910 : 7, 79-81, 106-107, 108, text-figs 86, 87, table 8, pl. 2 fig. 31 [Okayama, Japan; infesting "*Penaeus* sp."]. — CHOPRA, 1923 : 454, 458. — NIERSTRASZ & BRENDER à BRANDIS, 1929 : 302. — HIRAIWA, 1933 : 49-69, text-figs 1-23, pl. 1 [Hiroshima Bay, Japan; infesting *Metapenaeopsis barbatus* de Haan, *M. aclivis* (Rathbun) and *M. lamellata* (de Haan); morphology and systematics]; 1934 : 45-62, figs 1-14 [Hiroshima Bay, Japan; infesting *M. barbatus*; internal structure]; 1936 : 101-137, pls 1-7 [Same locality and host; development]. — MONOD, 1933 : 222. — REVERBERI, 1942 : 60. — REVERBERI & PITOTTI, 1942 : 116, 123. — NATARAJ, 1943 : 58 [Travancore, India; infesting unidentified penaeoid]. — MORRIS, 1948 : 4; 1949 : 211. — QAZI, 1959 : 56, 59-60. — IVANOV, 1982 : 197. — CASH & BAUER, 1993 : 123.

Epipenaeon japonicum - NIERSTRASZ & BRENDER à BRANDIS, 1923 : 68; 1931 : 58. — BARNARD, 1925 : 408 [Delagoa Bay, Mozambique; infesting *Penaeopsis monoceros* Fabricius]; 1926 : 121 [Delagoa Bay, Mozambique; infesting unspecified host]; 1940 : 494. — MONOD, 1933 : 220. — VEILLET, 1945 : 282. — KENSLEY, 1978 : 152, 153, fig. 67H [New illustrations]. — SINDERMANN, 1990 : 196.

Apopenaeon japonicum - SHINO, 1934 : 260-263, fig. 2 [Tanabe Bay, Japan; infesting *Metapenaeopsis barbatus*]; 1939 : 80, fig. 1 [Tuyusaki, Fukuoka Prefecture, Kyusyu, Japan; infesting *M. aclivis*]; 1950 : 157. — BECK, 1980 : 148, 150, 152.

Epipenaeon japonicus - HIRAIWA & SATO, 1939 : 105-115, 121-122 [Hiroshima, Japan; infesting *M. barbatus*; effects on host]. — REVERBERI, 1943 : 45, fig. 37; 1949: 45-47, figs 37-38. — MORRIS, 1948 : 7, 14. — BAFFONI, 1950 : 215. — SINDERMANN & ROSENFIELD, 1967 : 361. — SINDERMANN, 1970 : 171. — DEVI, 1987 : 23, 26-27, 31, 32, table 1 [Kakinada, India; infesting *Penaeus japonicus* Bate].

Source : MNHN, Paris

Apopenaeon japonicum var. *hiraiwai* Shiino, 1950 : 151-155, fig. 1 [Kutino, Izo, Japan; infesting *M. aclivis*]; 1958 : 51-53, fig. 13, table 1, plate III fig. 7 [Several Japanese localities; infesting *M. aclivis* and *M. barbatus*].
?"Bopyrid parasites" [in part] - CHEUNG, 1963 : 428 [Hong Kong; infesting one or more species of five penaeid genera].
Apopenaeon japonicum hiraiwai - STROMBERG, 1971 : 6, 7, 29, 31, 33-34, 39, 42. — SHIINO, 1950 : 155 [Japanese records]. — PALISOC, 1987 : 286.
Apopenaeon japonica - SHIINO, 1950 : 155.

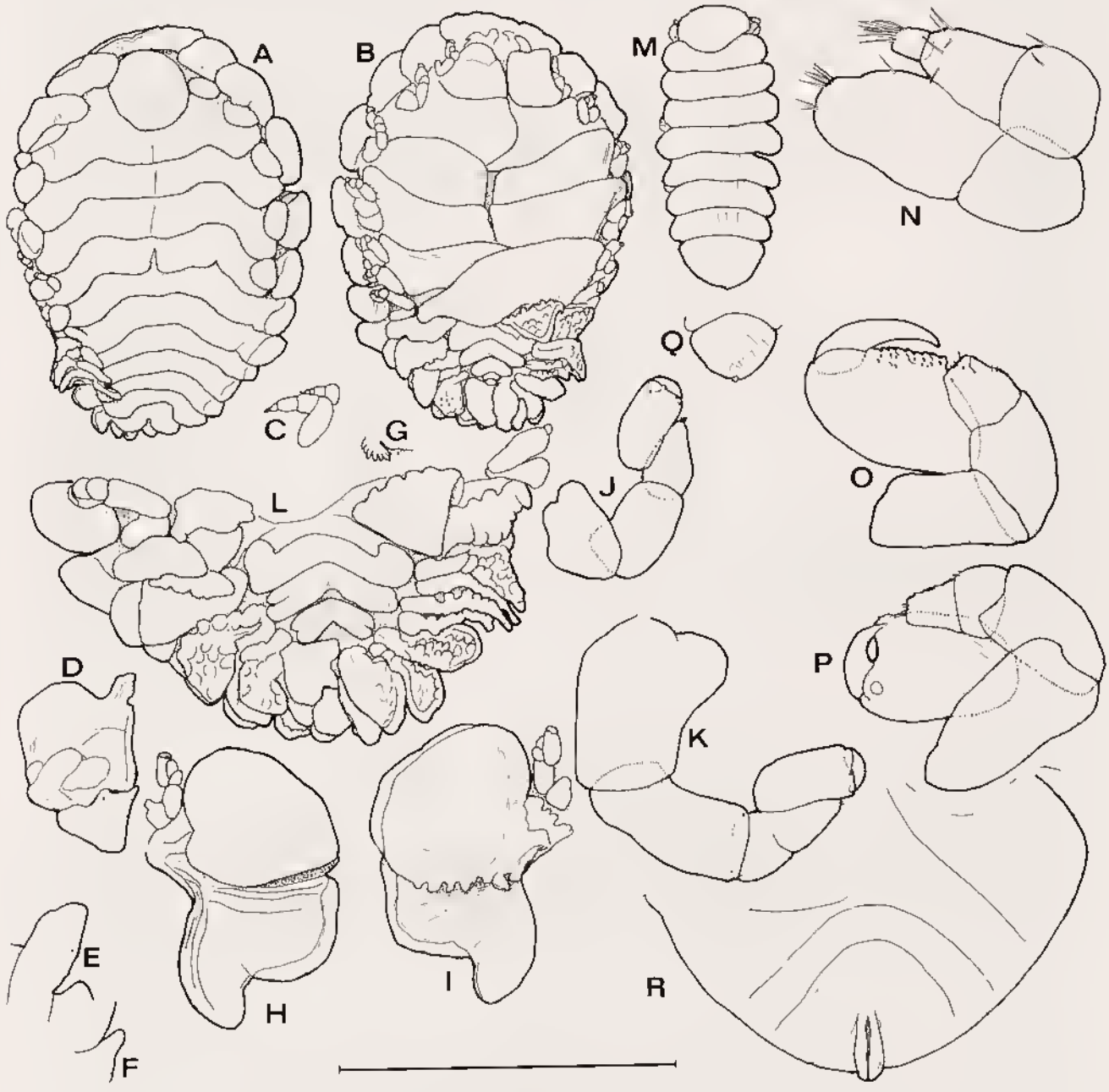

FIG. 10. — *Parapenaeon japonica* (Thielemann, 1910). A-L, female. M-R, male. **A**, Dorsal view. **B**, Ventral view. **C**, Right antennae. **D**, Maxilliped. **E**, Palp of same. **F**, Plectron of same. **G**, Right side of barbula. **H**, Oostegite 1, external view. **I**, Same, internal view. **J**, Right pereopod 1. **K**, Right pereopod 7. **L**, Pleon, ventral view. **M**, Pleon, dorsal view. **N**, Right antennae. **O**, Right pereopod 1. **P**, Right pereopod 7. **Q**, Pleon in dorsal view. **R**, Same in ventral view.

Scale : 4.0 mm for A, B, G; 2.0 mm for C, D, H, I, L, M, Q; 0.6 mm for E, F, J, K; 0.15 mm for N.

Source : MNHN, Paris

Parapenaeon japonicum - BOURDON, 1979a : 480-486, figs 6-7 [Madagascar; infesting *M. monoceros* (Fabricius) and *Penaeus semisulcatus* de Haan; redescription and discussion]; 1979c : 432 [Gulf of Martaban, Burma; infesting *Parapenaeopsis sculptilis* (Heller)]. — BRANFORD, 1980 : 276, table 1 [Red Sea; infesting *Penaeus latisulcatus* Kishinouye]. — IVANOV, 1982 : 196 [Western Indian Ocean; infesting *Metapenaeus monoceros*]. — MIQUEL, 1982 : 94. — MARKHAM, 1986 : 159. — ANDERSON, 1990 : 290. — COURTNEY, 1991 : 615, 617, 620, table 2 [Central coast of Queensland, Australia; infesting *Penaeus longistylus* Kubo].

Parapenaeon japonica - MARKHAM, 1982 : 366-369, 385, fig. 23-24 [Pearl River Estuary, Hong Kong; infesting *Penaeus japonicus*]; 1985b : 3, 50-51, 63, table [Chonburi, Thailand; infesting *Trachypenaeus fulvus* Dall].

Epipenaeon - WILSON, 1991 : 239, fig. 13.4.

MATERIAL EXAMINED. — **Indonesia**. Strait of Makassar, CORINDON 2 : stn 295, 01°26.5'S, 117°02.3'E, 54-51 m, fish trawl. Infesting *Metapenaeopsis sinica* Liu & Zhong, det. of host A. CROSNIER : 1 ♀, 1 ♂ (MNHN-Ep 817).

Philippines. MUSORSTOM 3 : stn CP 134, 12°01'N, 121°57'E, 92-95 m, 5 June 1985. Infesting *Metapenaeopsis velutinus* (Dana), det. of host A. CROSNIER : 2 ♀, 2 ♂ [of which 1 ♂ drawn] (MNHN-Ep 832).

NW of Madagascar. Banc du Geyser, BENTHEDI : stn 117, lagon, partie sud, 11 April 1977, 3-8 m on coralline rock with *Halimeda* fragments. Infesting *Metapenaeopsis hilarula* (de Man), det. of host A. CROSNIER : 1 ♀, 1 ♂ [both drawn] (MNHN-Ep 816).

DISCUSSION. — Diagnostic characters for *P. japonica* are, in the female, the general body shape and proportions, the large coxal plates on the short side of the first two pereomeres and on the long side of all pereomeres, the irregularly digitate internal ridge of the first oostegite, the short foliate tuberculate pleonal appendages and the posterior notch of the final pleomere; and, in the male, the extended head, the large anterior dactyli, the fringed propodi and the semicircular pleon with an occasional posterior indentation. One female has the nonarticulating extended palp anteriorly rather than anterolaterally placed on the maxilliped, one male has its head fused with the pereon, and one (Fig. 11) has eyes, in addition to the variable pleonal notch. Some hosts of *Parapenaeon japonica* previously reported have belonged to the genus *Metapenaeopsis*, but all three of the present hosts are new species records. *Parapenaeon japonica* is a very widespread species whose known range, from the Red Sea and Madagascar to Japan, is essentially that of its subfamily as a whole. Still, the finds in the Strait of Makassar and the Philippines are new geographical records.

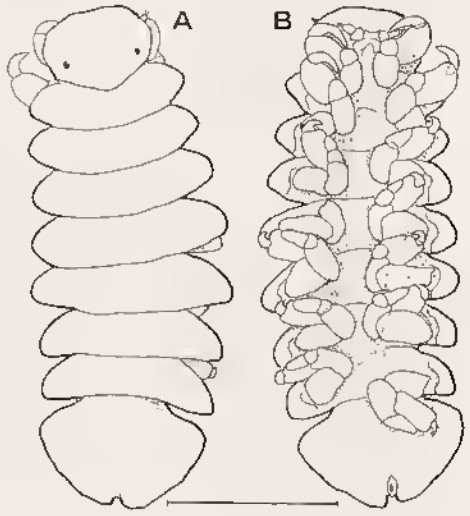

FIG. 11. — *Parapenaeon japonica* (Thielemann, 1910), male. A, Dorsal view. B, Ventral view. Scale : 1.0 mm.

As the synonymy indicates, there has been much confusion about the gender of the generic name *Parapenaeon*. It would seem to be a Greek neuter noun, but RICHARDSON (1904), in describing its type-species, *Parapenaeon consolidata*, indicated by the feminine ending that she considered her new generic name to be feminine. I have followed that precedent in calling this species *P. japonica* and the following ones *P. brevicoxalis*, *P. expansa* and *P. secunda*.

Parapenaeon brevicoxalis Bourdon, 1981

Figs 12-13

Parapenaeon brevicoxale Bourdon, 1981 : 239, 249-251, figs 10-11, table II [between Bohol and Cebu Islands, Philippines; infesting *Penaeopsis rectacuta* (Bate)].

MATERIAL EXAMINED. — **Chesterfield Islands**. MUSORSTOM 5 : stn 364: 19°45.30'S, 158°46.50'E, 675 m, 19 October 1986. Infesting *Hymenopenaeus halli* Bruce, det. of host A. CROSNIER : 2 ♀, 1 ♂ (MNHN-Ep 830). —

Source : MNHN, Paris

Stn 365, 19°42.82'S, 158°48.00'E, 710 m, 19 October 1986. Infesting *Hymenopenaeus halli* Bruce, det. of host A. CROSNIER : 7 ♀ (1 infested by hyperparasitic *Cabirops* sp.; 1 drawn), 6 ♂ (1 drawn) (MNHN-Ep 831).

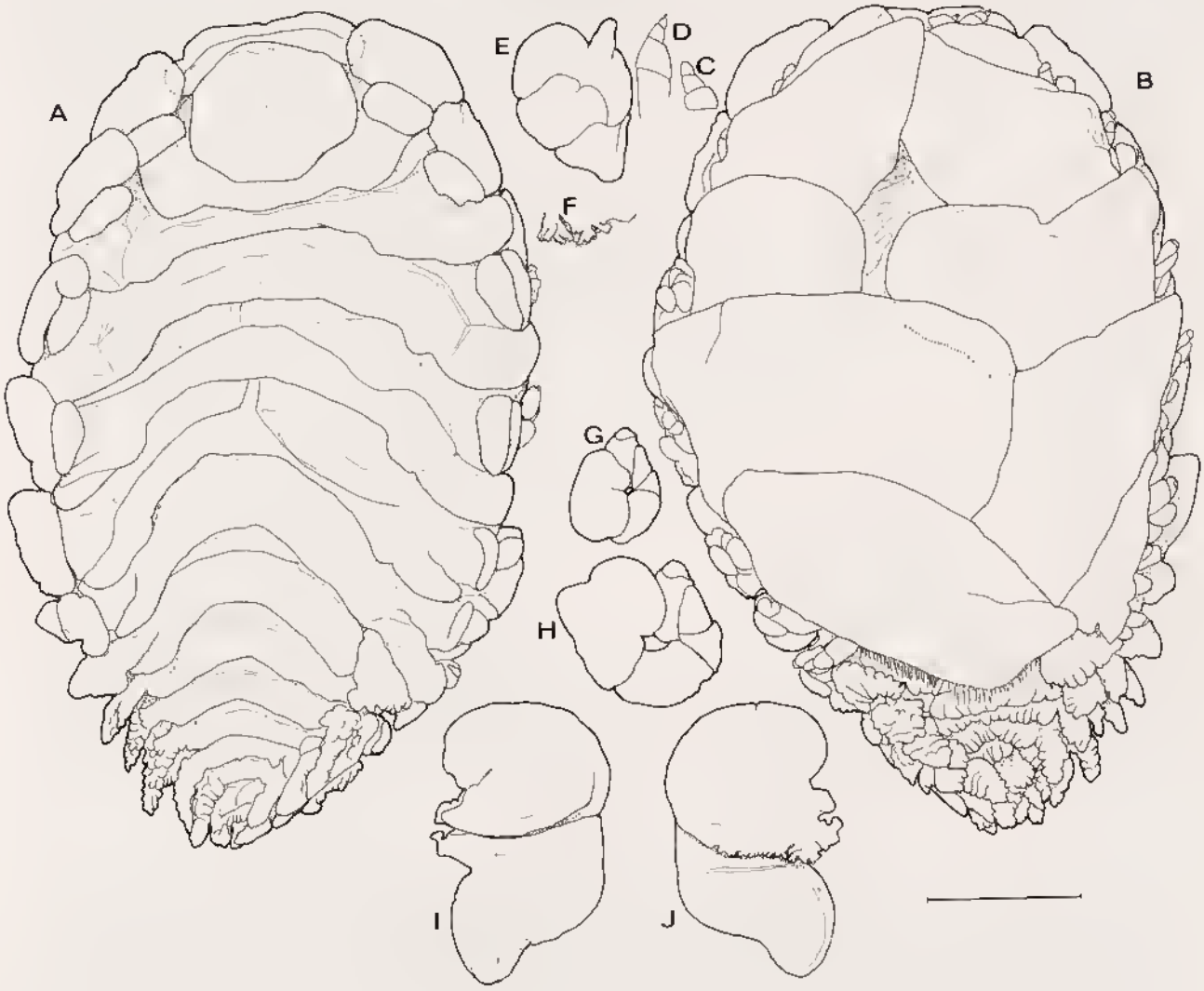

FIG. 12. — *Parapenaeon brevicoxalis* Bourdon, 1981. **A**, Dorsal view. **B**, Ventral view. **C**, Right antenna 1. **D**, Right antenna 2. **E**, Right maxilliped. **F**, Right side of barbula. **G**, Right pereopod 1. **H**, Right pereopod 7. **I**, Right oostegite 1, external view. **J**, Same, internal view.
Scale : 2.0 mm for A, B, E, F; 1.0 mm for C, D, G, H.

DISCUSSION. — The female of *Parapenaeon brevicoxalis* drawn (Fig. 12) is quite similar to the holotype, except for some minor details. Its frontal lamina extends less to the sides, its head is longer and narrower (Fig. 12A), its maxilliped palp is slightly broader (Fig. 12E), the posterolateral projection of the first oostegite is broader (Fig. 12I-J), the pereomeres are separated clear across, and the sixth pleomere is visible dorsally (Fig. 12A). The male drawn (Fig. 13) differs in having a narrower head and slightly more extended pleon. Three of the females are dextral and seven sinistral; all closely resemble the one illustrated. One of the males examined has a markedly pointed pleon, but otherwise the males are essentially alike. Although one of the females bore a hyperparasite, it was also accompanied by a male, an unusual occurrence. This is the first record of *P. brevicoxalis* since its initial discovery in the Philippines, so Chesterfield Islands is a new locality record for it; *Hymenopenaeus halli* is a new host record.

Source : MNHN, Paris

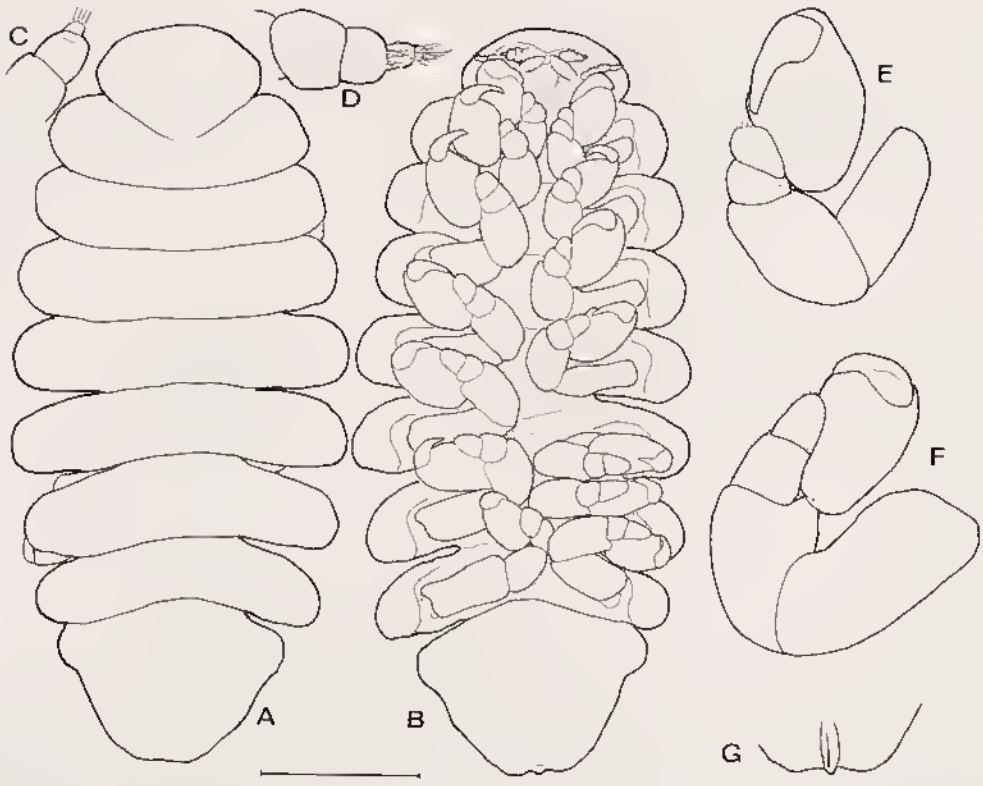

FIG. 13. — *Parapenaeon brevicoxalis* Bourdon, 1981, male. **A**, Dorsal view. **B**, Ventral view. **C**, Left antenna 1. **D**, Left antenna 2. **E**, Left pereopod 1. **F**, Left pereopod 2. **G**, End of pleon in ventral view.
Scale : 1.00 mm for A, B; 0.12 mm for C, D; 0.31 mm for E, F; 0.53 mm for G.

Parapenaeon expansa Bourdon, 1979

Fig. 14

Parapenaeon expansus Bourdon, 1979a : 494, 495-498, figs 15-17, 18b-c [Near Madagascar, infesting *Penaeus teraoi* Kubo = *Penaeus (Melicertus) marginatus* Randall]. — NEARHOS & LESTER, 1984 : 257, 258 [Moreton Bay, Queensland, Australia, infesting *Penaeus (Melicertus) plebejus* Hess; and Karumbu, Gulf of Carpentaria, Australia, infesting *Penaeus* sp.]. — OWENS & GLAZEBROOK, 1985 : 105-112, tables 2-4 [Several localities, northern Australia, infesting *P. indicus* H. Milne Edwards, *P. merguiensis* de Man and *P. longistylus* Kubo]. — ANDERSON, 1990 : 290. — OWENS & ROTHLISBERG, 1991 : 779.

?*Parapenaeon* prox. *expansus* Bourdon, 1979c : 435 [North Darwin, Northern Territory, Australia, infesting "tiger prawn" ? = *Penaeus esculentus* Haswell or *P. semisulcatus* de Haan].

MATERIAL EXAMINED. — **New Caledonia**. Baie Iré, night dive, P. LABOUTE coll., 15 m, 29 May 1990. Infesting *Metapenaeopsis gaillardi* Crosnier, det. of host A. CROSNIER : 1 ♀, 1 ♂ [Both drawn] (MNHN-Ep 818).

Indonesia. Strait of Makassar. CORINDON 2 : stn 201, 01°10.2'S, 117°06.1'E, 21 m, fish trawl, 30 October 1980. Infesting *Metapenaeopsis sinica* Liu & Zhong, det. of host A. CROSNIER : 1 ♀ (MNHN-Ep 828).

Seychelles. REVES 2 : stn. 4, 05°07.7'S, 56°34.0'E, 32 m, 2 September 1980. Infesting *Metapenaeopsis faouzii* Ramadan, det. of host A. CROSNIER : 1 ♀ (MNHN-Ep 823).

Madagascar. NW coast. Infesting *Metapenaeopsis mogiensis consobrina* (Nobili), det. of host A. CROSNIER : 1 ♀, 1 ♂ (MNHN-Ep 833).

DISCUSSION. — Although the present material differs from the types of *Parapenaeon expansa* in some details, it appears assignable to that species because of the female's body shape, great extension of frontal lamina and coxal

Source : MNHN, Paris

plates, deeply digitate barbula and internal ridge, pointed lateral plates and cleft last pleomere. The males are less similar, in that the type had a smaller head, no eyes, larger seventh dactyli and a longer pleon. All of the present material infested species of *Metapenaeopsis*, while all previous records were of parasites of *Penaeus* spp., so all of the present hosts are new records. *Parapenaeon expansa* is previously known from Madagascar, its type-locality, but the records from the Strait of Makassar, New Caledonia and the Seychelles are new.

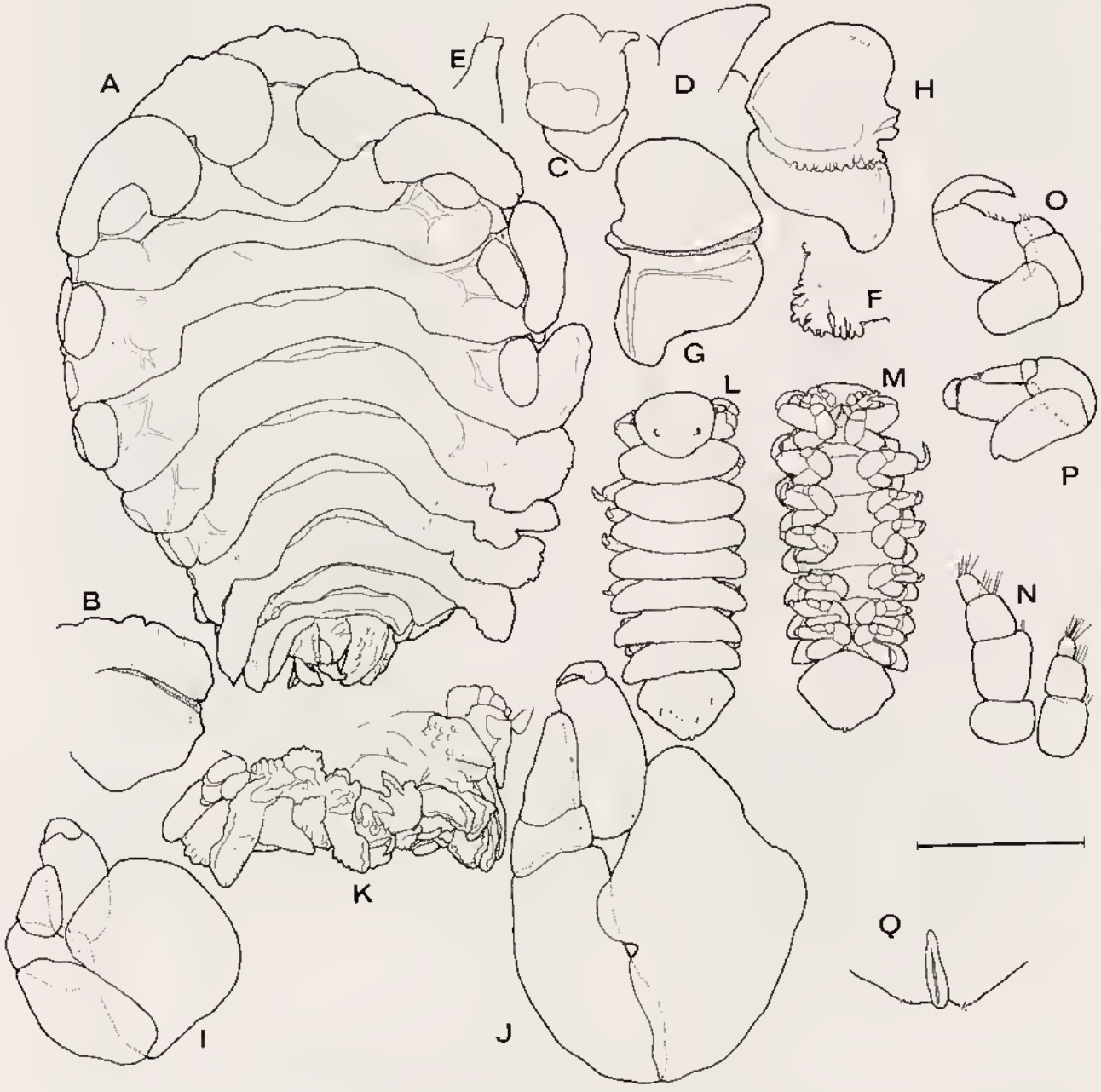

Fig. 14. — *Parapenaeon expansa* Bourdon, 1979. A-K, female; L-Q, male. **A**, Dorsal view. **B**, Right side of head. **C**, Right maxilliped. **D**, Palp of same. **E**, Plectron of same. **F**, Right side of barbula. **G**, Right oostegite 1, external view. **H**, Same, internal view. **I**, Right pereopod 1. **J**, Right pereopod 7. **K**, Pleon in ventral view. **L**, Dorsal view. **M**, Ventral view. **N**, Right antennae. **O**, Right pereopod 1. **P**, Right pereopod 7. **Q**, End of pleon in ventral view.
Scale : 2.00 mm for A-C, F-H, K; 1.00 mm for L, M; 0.52 mm for D, E; 0.31 mm for I, J, O, P; 0.15 mm for N, Q.

Source : MNHN, Paris

Parapenaeon secunda Nierstrasz & Brender à Brandis, 1923

Figs 15-16

Parapenaeon secundum Nierstrasz & Brender à Brandis, 1923 : 67-68, fig. 4a-e [South of Flores Island, Indonesia, infesting *Parapenaeus fissurus* (Bate)]. — NIERSTRASZ & BRENDER à BRANDIS, 1932 : 93-94. — PILLAI, 1954 : 21. — BOURDON, 1979c : 435; 1981 : 245, 255.

Non *Parapenaeon* prox. *secundum* Bourdon, 1979a : 492-495, figs 13-14 = *Parapenaeon coarctatum* Bourdon, 1981.

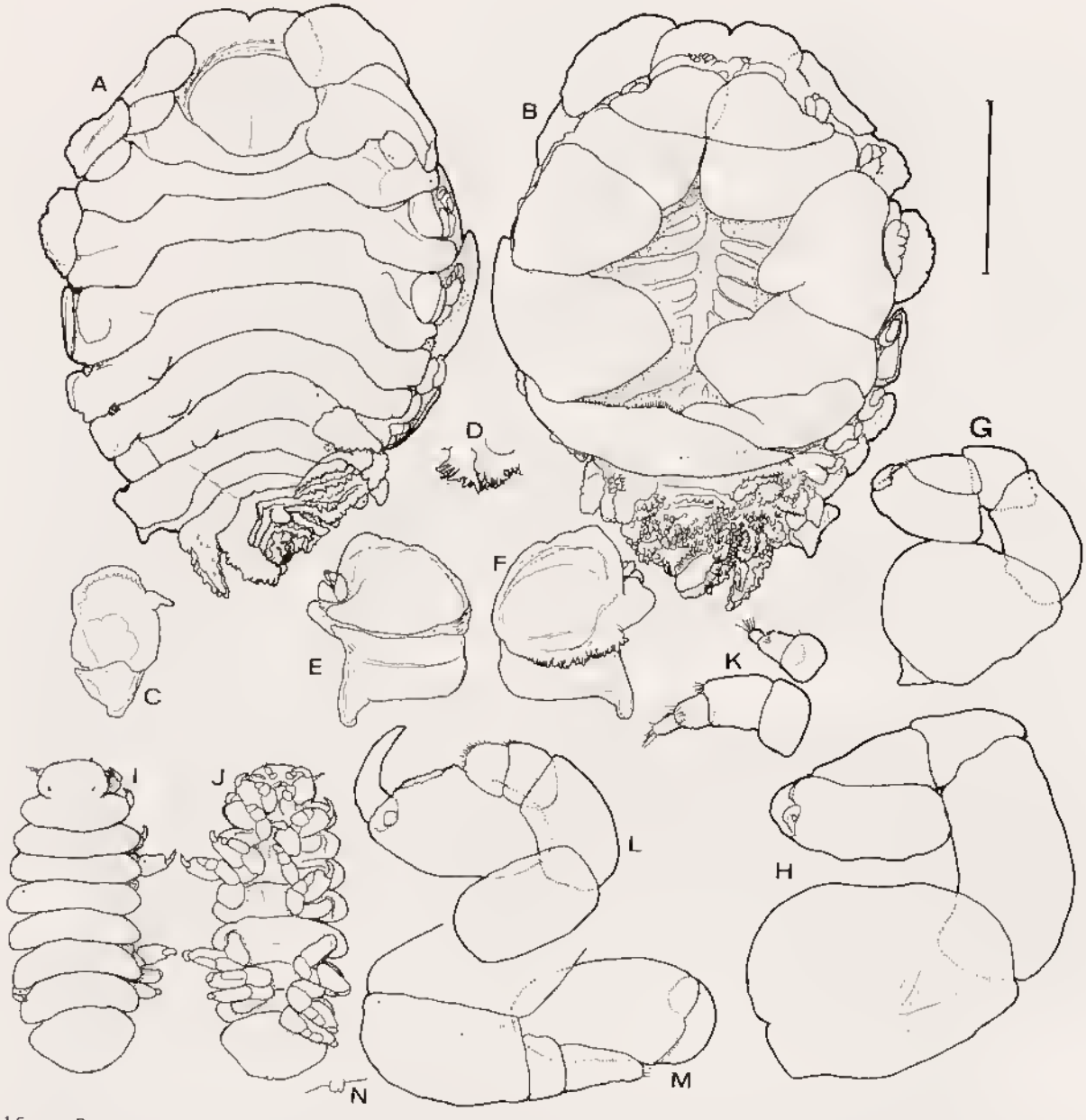

Fig. 15. — *Parapenaeon secunda* Nierstrasz & Brender à Brandis, 1923, A-H, female; I-N, male. **A**, Dorsal view. **B**, Ventral view. **C**, Right maxilliped. **D**, Right side of barbula. **E**, Right oostegite 1, external view. **F**, Same, internal view. **G**, Left pereopod 1. **H**, Left pereopod 7. **I**, Dorsal view. **J**, Ventral view. **K**, Right antennae. **L**, Right pereopod 1. **M**, Left pereopod 7. **N**, End of pleon in ventral view.

Scale : 4.0 mm for A-F, I, J; 0.5 mm for G, H; 0.3 mm for K-N.

Source : MNHN, Paris

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 2 : stn 86, near Manila, 50 m, 02 December 1980. Infesting *Metapenaeopsis palmensis* (Haswell), det. of host A. CROSNIER : 1 ♀ immature [Drawn] (MNHN-Ep 822).

Indonesia. Strait of Makassar. CORINDON 2 : stn 295, 01°26.5S, 117°02.1'E, 54-51 m. Infesting *Metapenaeopsis sinica* Liu & Zhong, det. of host A. CROSNIER : 1 ♀, 1 ♂ [Both drawn] (MNHN).

DISCUSSION. — Although some doubt remains whether all described species of *Parapenaeon* are valid and thus distinguishable, this material seems assignable to *P. secunda*. The adult female (Fig. 15A-H) shows the body outline, large coxal plates (two of them serrated), slender and laterally placed maxilliped palp, deeply digitate barbula, slender posterolateral projection of the first oostegite, and long narrow tuberculate pleonal appendages of the holotype. The present male (Fig. 15I-M) is rather more different from the allotype, which had the head separate from the pereon and a pointed pleon. The small immature female (Fig. 16) differs from the holotype in some details, such as the more nearly circular body outline, the proportionately larger coxal plates, the flat nearly closed brood pouch and the less extended pleon. Because of these differences, to be expected in an immature female, it is somewhat difficult to assign with certainty to any species, though it does appear to belong here. Both the Philippines and the Strait of Makassar are new localities for *P. secunda*, and the hosts in the genus *Metapenaeopsis* are also new records.

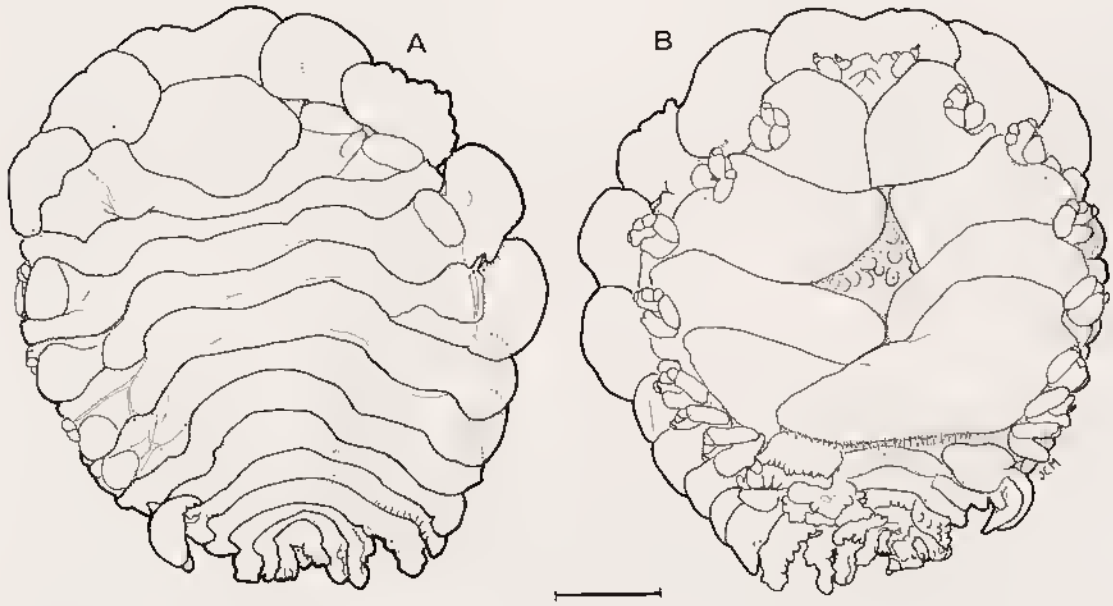

Fig. 16. — *Parapenaeon secunda* Nierstrasz & Brender à Brandis, 1923, female. A, Dorsal view. B, Ventral view. Scale : 2.0 mm.

SUBFAMILY ATHELGINAE Codreanu, 1956

Pseudostegias setoensis Shiino, 1933

Fig. 17

Pseudostegias setoensis Shiino, 1933 : 290-293, fig. 16 [Seto, Japan, infesting *Clibanarius bimaculatus* de Haan]; 1950 : 161-162; 1952 : 35-36; 1958 : 68 [Seto, Wakayama Prefecture, Japan, infesting *C. bimaculatus*; and Taiwan, infesting *C. striolatus* Dana]; 1972 : 9. — LEMOS DE CASTRO, 1965 : 105-108. — MARKHAM, 1982 : 369-370, 372-373, 385 [Hong Kong, infesting *C. bimaculatus* and *C. ransoni* Forest]. — MORTON & MORTON, 1983 : 96, 98, 201, fig. 7, 5 (6), table 10.2 [Hong Kong, infesting *C. bimaculatus* and *C. striolatus*]. — PAGE, 1985 : 201, 203.

Source : MNHN, Paris

MATERIAL EXAMINED. — **Chesterfield Islands.** MUSORSTOM 5 : stn 361, 19°53.50'S, 158.38'10'E, 400 m, 19 October 1986. Infesting "*Trizopagurus*" sp. (to be described as gen. nov., sp. nov. by J. FOREST), det. of host J. FOREST : 1 ♀, 1 ♂ (MNHN-Ep 819).

New Caledonia. SMIB 4 : stn DW 67, Ride de Norfolk, 22°55.1'S, 167°15.6'E, 460 m, 10 March 1989. Infesting "*Trizopagurus*" sp. (to be described as gen. nov., sp. nov. by J. FOREST), det. of host J. FOREST : 1 ♀, 1 ♂ [Both drawn], (MNHN-Ep 834).

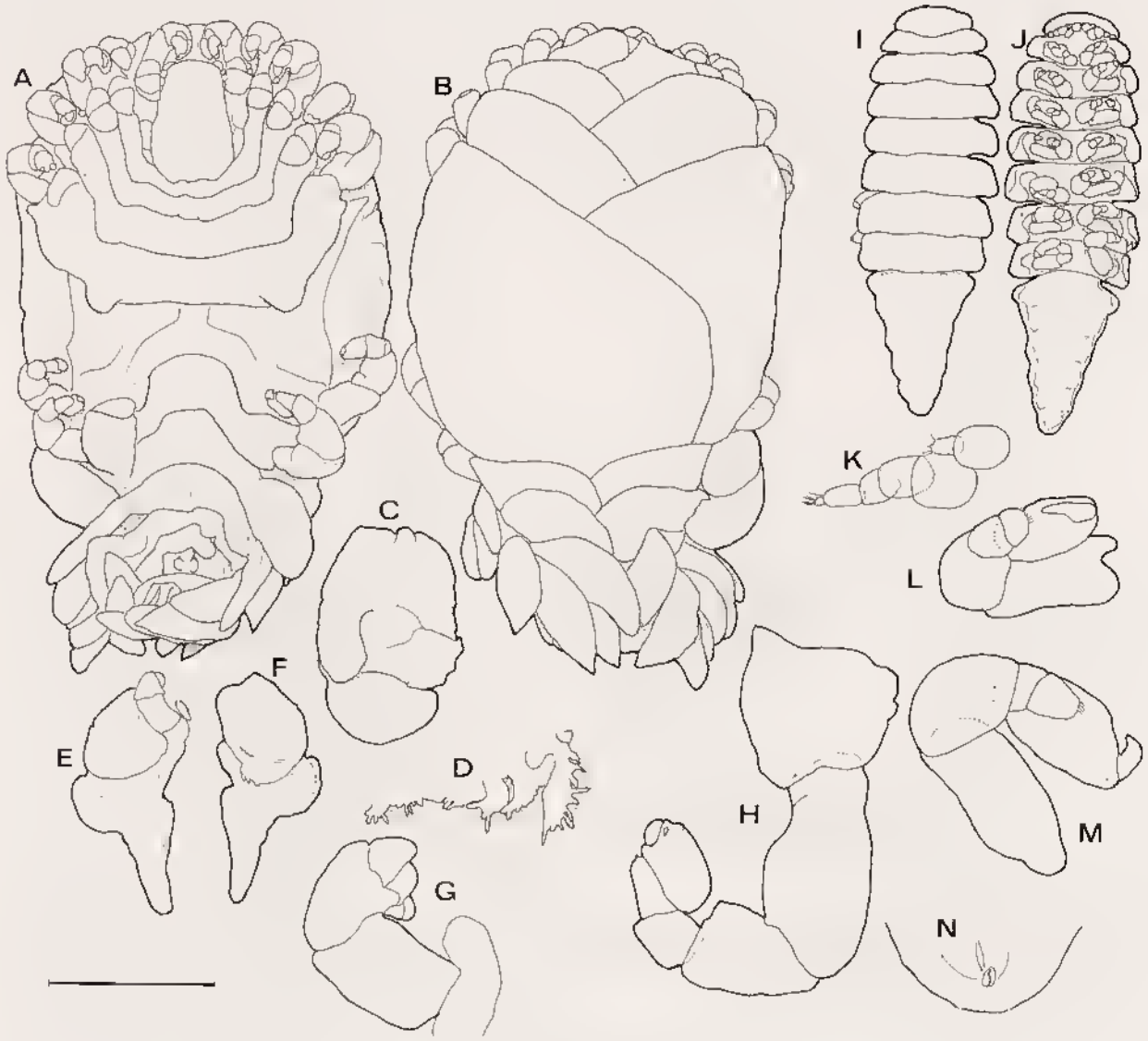

Fig. 17. — *Pseudostegias setoensis* Shiino, 1933. A-H, female; I-N, male. **A**, Dorsal view. **B**, Ventral view. **C**, Right maxilliped. **D**, Left side of barbula. **E**, Right oostegite 1 in external view. **F**, Same in internal view. **G**, Right pereopod 1. **H**, Right pereopod 7. **I**, Dorsal view. **J**, Ventral view. **K**, Right antennae. **L**, Left pereopod 1. **M**, Left pereopod 7. **N**, End of pleon in ventral view.

Scale : 4.0 mm for A, B, E, F; 2.0 mm for C, D, I, J; 1.0 mm for G, H; 0.3 mm for K-N.

DISCUSSION. — In contrast to previously recorded specimens, the female drawn is relatively slightly broader anteriorly, and its pleonal lateral plates less extended: and the illustrated male has head and pleon both slightly shorter and no eyes. The other two specimens examined are nearly identical with those illustrated. Chesterfield

Source : MNHN, Paris

Islands and New Caledonia are new localities for *Pseudostegias setoensis*, and the host hermit crab, the first not in the genus *Clibanarius*, is also a new record.

SUBFAMILY ENTOPHILINAE Richardson, 1903

Entophilus omnitectus Richardson, 1903

Entophilus omnitectus Richardson, 1903 : 824-826, figs 6-8 [Between islands of Hawaii and Molokai, Hawaii, infesting *Munida normanni* Henderson; made type of Subfamily Entophilinae nov.]. — RICHARDSON, 1904 : 679-681, figs 34-39 [Reprint of above article]. — NIERSTRASZ & BRENDER à BRANDIS, 1923 : 63, 66. — DANFORTH, 1963 : 847, 849; 1970a : 27; 1970b : 462. — BOURDON, 1976 : 385-391, figs 21-23 [Madagascar, infesting *M. incerta* Henderson; redescription]; 1979b : 511 [Azores, infesting *M. sanctipauli* Henderson; mention of unpublished records from Australia and Philippines]. — BOURDON *et al.*, 1981 : 498-500, 502, fig. 6II. — MARKHAM, 1986 : 144, 148, 156, fig. 1H. — ADKISON & COLLARD, 1990 : 649-654, figs 1b-l, 2 [Northern Gulf of Mexico, infesting *M. valida* Smith and *M. microphthalma* A. Milne Edwards].

MATERIAL EXAMINED. — **Chesterfield Islands**. MUSORSTOM 5 : stn 365, 19°42.82'S, 150°48.00'E, 710 m, 19 October 1986. Infesting *Munida* "*incerta*" Henderson, det. of host K. BABA : 2 ♀, 2 ♂, (MNHN).

DISCUSSION. — Chesterfield Islands is an important extension of the range of *Entophilus omnitectus*, which is now known to infest several species of the galatheid genus *Munida* in deep waters around the world. The present material falls within the range of characters reported for this enigmatic species. Upon identifying the host on my behalf, Dr BABA pointed out that *Munida incerta* is a name applied to a complex of species yet to be properly described and separated. Thus it is uncertain whether the present host is the same as that reported for *E. omnitectus* at Madagascar by BOURDON (1979b), or what its true identity may ultimately prove to be.

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Source : MNHN, Paris

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Source : MNHN, Paris

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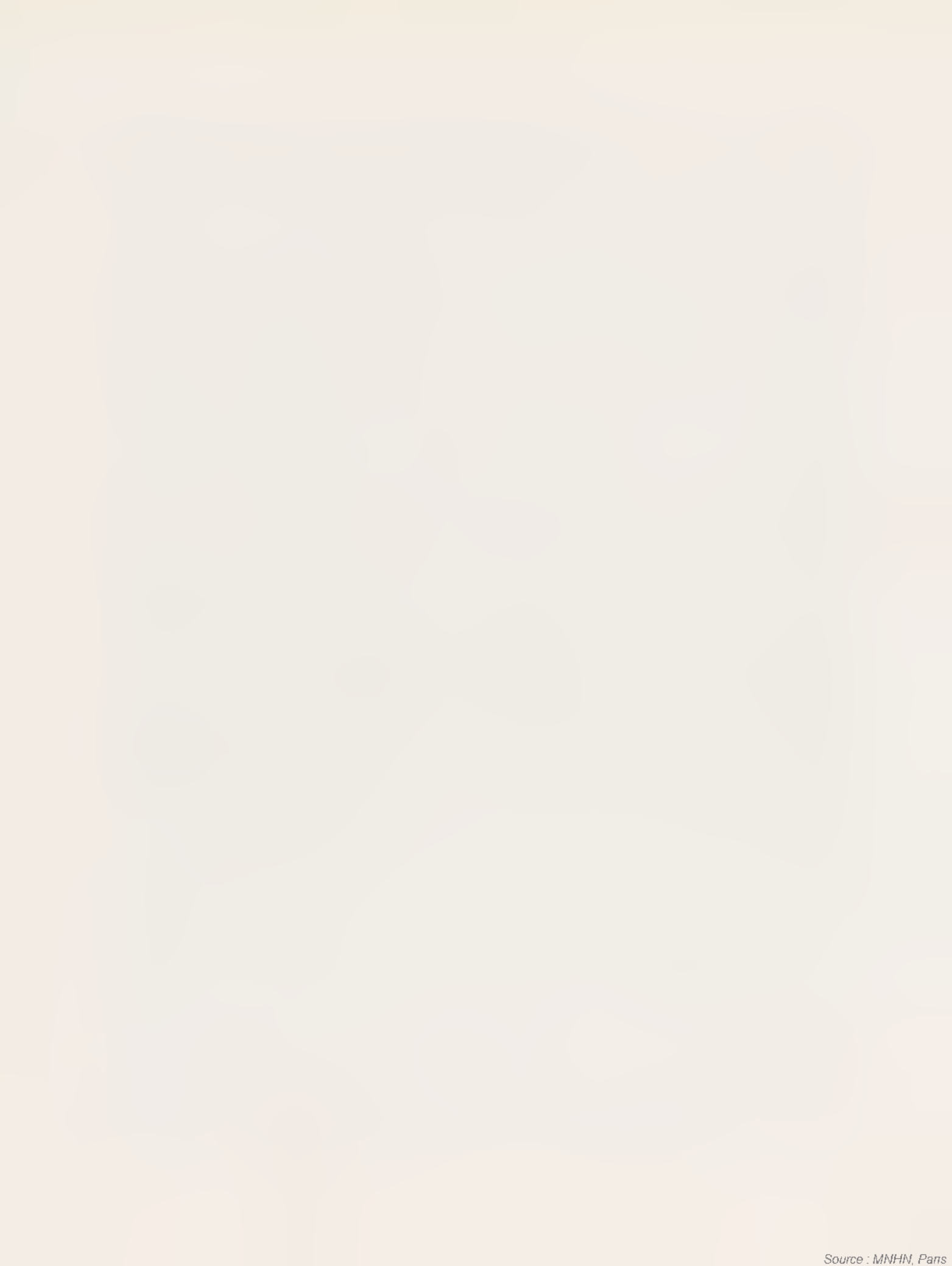
Source : MNHN, Paris



Source : MNHN, Paris

7

Crustacea Decapoda : Les *Metapenaeopsis* indo-ouest-pacifiques avec un appareil stridulant (Penaeidae)

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RÉSUMÉ

Ce travail, qui est la troisième et dernière partie de la révision du genre *Metapenaeopsis* que nous avons entreprise en 1987, traite des espèces pourvues d'un appareil stridulant.

De même que nos précédents travaux, celui-ci a été basé, au départ, sur les nombreuses récoltes faites par les chercheurs de l'ORSTOM dans l'Indo-Ouest-Pacifique et sur celles faites dans le cadre du programme MUSORSTOM, mené conjointement par l'ORSTOM et le Muséum national d'Histoire naturelle de Paris, essentiellement aux Philippines, en Indonésie et en Nouvelle-Calédonie. Il s'y est ajouté un matériel important fourni par divers Muséums et, en particulier, le National Museum of Natural History de Washington, qui a mis à notre disposition les récoltes de l'"*Albatross*" faites principalement aux Philippines.

Les spécimens, cités dans des publications, ont été réexaminés dans toute la mesure du possible.

Parmi les espèces déjà décrites, 14 sont reconnues comme valides : *M. acclivis* (Rathbun, 1902), *M. aegyptia* Galil & Golani, 1990, *M. barbata* (de Haan, 1844), *M. crassissima* Racek & Dall, 1965, *M. dura* Kubo, 1949, *M. fusca* R. J. G. Manning, 1988, *M. lindae* R. J . G. Manning, 1988, *M. novaeguineae* (Haswell, 1879), *M. palmensis* (Haswell, 1879), *M. rosea* Racek & Dall, 1965, *M. sinica* Liu & Zhong, 1988, *M. sinuosa* Dall, 1957, *M. stridulans* (Alcock, 1905), *M. toloensis* Hall, 1962.

Les synonymies de *M. akayebi* (Rathbun, 1902) avec *M. barbata* et de *M. barbeensis* Hall, 1962, avec *M. palmensis* sont confirmées.

La validité de *M. tchekanovae* Starobogatov, 1972, reste en suspens.

Une espèce nouvelle, *M. parapalmensis*, est décrite.

Ce ne sont finalement que 15 espèces qui sont étudiées ici, dont une seule est nouvelle. L'originalité de ce travail a en fait consisté à mettre de l'ordre dans la littérature et à donner, espérons nous, une idée claire des différentes espèces. Il s'est en effet révélé que, par le passé, les confusions entre espèces ont été très nombreuses.

Deux clés d'identification, l'une pour les mâles, l'autre pour les femelles sont proposées. Les caractères facilement utilisables retenus les rendent, malheureusement, entièrement artificielles et ne font pas ressortir les groupements

CROSNIER, A., 1994. — Crustacea Decapoda : Les *Metapenaeopsis* indo-ouest-pacifiques avec un appareil stridulant (Penaeidae). *In* : A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Volume 12. *Mém. Mus. natn. Hist. nat.*, **161** : 255-337, Paris ISBN 2-85653-212-8.

Source : MNHN, Paris

d'espèces. Ces clés sont surtout destinées à guider le lecteur vers l'illustration qui est abondante, étant donné la complexité des structures des pièces génitales largement utilisées pour distinguer les espèces. Les dessins, au trait et lavis, sont au nombre de 192, répartis en 45 figures.

Des tableaux montrent, de manière synoptique, les répartitions bathymétrique et géographique des diverses espèces. L'Australie se révèle particulièrement riche en espèces, l'océan Indien pauvre, la Polynésie et les îles Hawaii totalement dépourvues.

Dans le cas de l'Australie, on observe deux groupes d'espèces, l'un semble purement australien, l'autre composé d'espèces tropicales déferlant par le nord. Un groupe d'origine japonaise, migrant vers le sud, et un groupe indo-philippin, migrant dans toutes les directions, s'observent également. Quelques répartitions géographiques demeurent difficiles à expliquer, de manière satisfaisante, avec les données actuelles.

Après cette révision, le genre *Metapenaeopsis* compte 71 espèces ou sous-espèces, dont 46 sont indo-ouest-pacifiques, quatre est-pacifiques, cinq ouest-atlantiques et une est-atlantique.

ABSTRACT

Crustacea Decapoda : The Indo-West Pacific species of *Metapenaeopsis* with stridulating organs (Penaeidae).

This is the final work in a trilogy of papers and concludes the revision of the genus *Metapenaeopsis* which commenced in 1987. The present study refers to those species of *Metapenaeopsis* with stridulating organs.

As with the preceding papers, this study is primarily based on numerous specimens collected by ORSTOM scientists working in the Indo-West-Pacific. Further collections were made in the Philippines, Indonesia and New Caledonia as part of the MUSORSTOM programme, a joint project established between ORSTOM and the Muséum national d'Histoire naturelle, Paris. This material was supplemented by specimens from "*Albatross*" stations, principally from the Philippines, generously made available by the National Museum of Natural History, Washington. Numerous requests were also made to those institutions holding material cited in publications.

Of the species previously described, 14 are considered valid : *M. acclivis* (Rathbun, 1902), *M. aegyptia* Galil & Golani, 1990, *M. barbata* (de Haan, 1844), *M. crassissima* Racek & Dall, 1965, *M. dura* Kubo, 1949, *M. fusca* R. J. G. Manning, 1988, *M. lindae* R. J . G. Manning, 1988, *M. novaeguineae* (Haswell, 1879), *M. palmensis* (Haswell, 1879), *M. rosea* Racek & Dall, 1965, *M. sinica* Liu & Zhong, 1988, *M. sinuosa* Dall, 1957, *M. stridulans* (Alcock, 1905), and *M. toloensis* Hall, 1962.

The synonymies of *M. akayebi* (Rathbun, 1902) with *M. barbata* and of *M. barbeensis* Hall, 1962, with *M. palmensis* are confirmed.

The validity of *M. tchekunovae* Starobogatov, 1972, remains uncertain.

One new species, *M. parapalmensis*, is described.

Thus 15 valid species are studied here, of which one is new. The aim of this work has been to clarify the taxonomy of the group and, it is hoped, to give a clear idea of the different species. It has been shown that confusions between species have actually been very common in the past.

Two identification keys, one for females and another for males, are provided. The keys are supplemented by 192 illustrations arranged in 45 figures. The morphology of the genitalia is highly complex and for this reason these organs are drawn in various aspects.

Two synoptic tables are given showing the bathymetric and geographical distribution of species. Australia is particularly rich in species, in contrast to the Indian Ocean, which is poor, and Polynesia and Hawaii which are completely devoid of *Metapenaeopsis* species with stridulating organs.

The characters used in both keys are easy to use, but lead to artificial assemblages which do not reflect the natural groups of species. *Metapenaeopsis* species with stridulating organs seem to be divided into three natural groups, one originating from Japan and migrating southwards, a second originating from the Philippines and Indonesia and dispersing in all directions, and a third, endemic to Australia where members of the other two groups are also found. Some distributions, however, remain difficult to explain.

Now that the revision of *Metapenaeopsis* is completed, 71 species and subspecies have been recognized : 46 species from the Indo-West Pacific; 4 from the East Pacific; 5 from the West Atlantic; and 1 from the East Atlantic.

INTRODUCTION

Ce travail fait suite à ceux que nous avons publiés en 1987 [Les espèces indo-ouest-pacifiques d'eau profonde du genre *Metapenaeopsis* (Crustacea Decapoda Penaeidae), *Bull. Mus. natn. Hist. nat., Paris*, sér. 4, **9**, sect. A (2) : 409-453] et en 1991 [Crustacea Decapoda : Les *Metapenaeopsis* indo-ouest-pacifiques sans appareil stridulant

Source : MNHN, Paris

(Penaeidae). Deuxième partie. *In* : A. CROSNIER (ed.), Résultats des campagnes MUSORSTOM, Volume 9. *Mém. Mus. natn. Hist. nat.*, (A), **152** : 155-297]. Ces deux articles ont étudié l'ensemble des *Metapenaeopsis* indo-ouest-pacifiques sans appareil stridulant.

Le présent travail passe en revue les *Metapenaeopsis* indo-ouest-pacifiques munies d'un appareil stridulant. Cet appareil consiste en une rangée de crêtes transversales, situées sur chacune des faces latérales de la carapace, à leur tiers inférieur environ, juste en avant de leur bord postérieur. Ces crêtes peuvent s'engrener avec le bord latéral antérieur correspondant du premier segment abdominal. Le nombre et la taille des crêtes peuvent varier beaucoup d'une espèce à l'autre, fournissant ainsi de bons caractères systématiques, tempérés par le fait qu'à l'intérieur d'une même espèce on observe des variations non négligeables de ces caractères.

Le matériel étudié, de même que lors de nos travaux précédents cités plus haut, a été fourni, au départ, par les récoltes faites par les chercheurs de l'ORSTOM dans l'Indo-Ouest-Pacifique, à Madagascar (récoltes du *"Vauban"*), aux Seychelles (campagne REVES), en Nouvelle-Calédonie (programme LAGON principalement) et par certaines de celles faites conjointement par l'ORSTOM et le Muséum national d'Histoire naturelle (campagnes MUSORSTOM 1-3 aux Philippines, CORINDON en Indonésie, en particulier). Nous avons donné dans l'introduction de notre travail de 1991, les références bibliographiques permettant d'obtenir des détails sur ces récoltes et nous n'y reviendrons pas ici. Nous mentionnerons toutefois qu'en 1991, B. RICHER DE FORGES a publié un travail très complet sur les échantillonnages effectués dans le cadre du programme LAGON auquel le lecteur pourra se reporter utilement.

Du matériel complémentaire nous a été fourni par de nombreux muséums et instituts dont nous donnons ci-après la liste avec les abréviations correspondantes, utilisées pour indiquer, dans cet ouvrage, les origines du matériel examiné :

AMS : Australian Museum, Sydney.
BMNH : The Natural History Museum (anciennement British Museum, Natural History), Londres.
MNHN : Muséum national d'Histoire naturelle, Paris.
SMF : Natur-Museum Senckenberg, Francfort/Main.
NMW : Naturhistorisches Museum, Vienne.
MSNTO : Museo Civico di Storia Naturale di Torino.
NTM : Northern Territory Museum, Darwin.
NTOU : National Taiwan Ocean University, Keelung.
POLIPI : Pusat Penelitian dan Pengembangan Oseanologi -LIPI, Djakarta.
QM : Queensland Museum, Brisbane.
RMNH : Nationaal Natuurhistorisch Museum (anciennement Rijksmuseum van Natuurlijke Historie), Leiden.
SAM : South African Museum, Le Cap.
UMZC : University Museum of Zoology, Cambridge.
VM : Victoria Museum, Melbourne.
USNM : National Museum of Natural History, Washington.
WAM : Western Australian Museum, Perth.
ZMA : Zoölogisch Museum, Amsterdam.
ZMUC : Zoologisk Museum, Copenhague.
MMSU : Muséum de Zoologie, Université de Moscou.
ZIL : Zoological Institute of Russia, St Petersbourg.

Outre les organismes ci-dessus, plusieurs collègues, dont on trouvera la liste en fin de travail dans le chapitre remerciements, nous ont envoyé des dons de matériel.

L'absence de tout technicien pour aider à l'enregistrement du matériel examiné, nous a conduit à ne plus enregistrer ce matériel, sauf lorsqu'il s'agit de types ou de spécimens figurés. Lorsque le matériel était déjà enregistré, avant notre étude, ces numéros sont indiqués.

L'ensemble de notre matériel est déposé au Muséum national d'Histoire naturelle, à Paris, à l'exception de doubles, envoyés, dans toute la mesure du possible, au National Museum of Natural History à Washington.

Source : MNHN, Paris

Les références fournies pour chaque espèce ne sauraient être considérées comme complètes, surtout pour les espèces à large répartititon, souvent abondamment citées, mais nous espérons que toutes les importantes s'y trouvent.

À quelques rares exceptions près (clairement indiquées), aucune des références citées n'a été copiée d'un autre auteur. Comme à notre habitude, nous les avons toutes vérifiées d'après les textes originaux.

Comme dans nos travaux antérieurs, les dimensions des spécimens correspondent à la longueur de la carapace (Lc), mesurée du fond de l'orbite à la partie dorsale du bord postérieur de la carapace. Lorsque nous mentionnons la longueur totale (Lt), celle-ci correspond à la distance séparant la pointe du rostre de l'extrémité du telson.

Mentionnons, enfin, que les noms des navires ayant effectués les récoltes sont en italiques et entre guillemets.

ÉTUDE SYSTÉMATIQUE

Genre *METAPENAEOPSIS* Bouvier, 1905

Nous ne reviendrons pas ici sur la définition du genre *Metapenaeopsis*. Nous l'avons donnée dans notre travail de 1987 et nous y renvoyons le lecteur, afin d'éviter des répétitions fastidieuses.

De même, nous ne redonnons pas ici le tableau indiquant la répartition des branchies, épipodites et exopodites dans le genre. Nous l'avons publié en 1987 et 1991 et renvoyons le lecteur à l'un de ces deux travaux. Nous mentionnerons simplement que toutes les espèces traitées ici ont la formule type des *Metapenaeopsis* que nous avons publiée. La pleurobranchie antéroventrale du segment VII, comme cela est la règle dans le genre, est toujours réduite à une lamelle plus ou moins développée, non divisée et souvent difficile à discerner.

Les diverses espèces de *Metapenaeopsis* étudiées ici présentent un aspect très homogène (de même d'ailleurs que l'ensemble des *Metapenaeopsis*). Afin d'éviter de continuelles redites dont la monotonie émousse vite l'attention, nous avons renoncé à donner des descriptions complètes des diverses espèces. De même que dans notre travail de 1991, nous nous contenterons d'insister sur quelques bons caractères permettant de séparer les espèces :

— le rostre (forme, longueur, nombre de dents);
— la taille de l'épine ptérygostomienne;
— l'appareil stridulant;

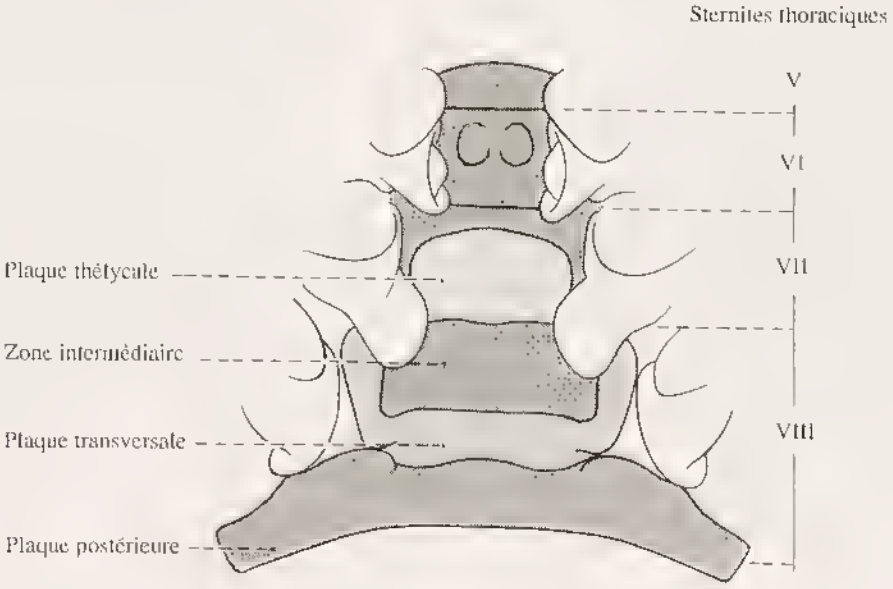

FIG. 1. — Termes utilisés pour la description des derniers sternites thoraciques chez la femelle.

Source : MNHN, Paris

— la carène dorsale du troisième segment abdominal;
— le thélycum et le pétasma.

Bien entendu, les autres particularités propres à une espèce sont détaillées dès qu'elles sont significatives. Chaque fois que cela a été possible, nous donnons des renseignements sur la coloration des espèces.

La nomenclature utilisée pour désigner les diverses parties du thélycum et du pétasma est indiquée sur les figures 1 et 2. Nous nous sommes bien entendu efforcé de lui donner le maximum de cohérence avec celle utilisée, dans nos travaux précédents, pour le groupe des *Metapenaeopsis* sans appareil stridulant.

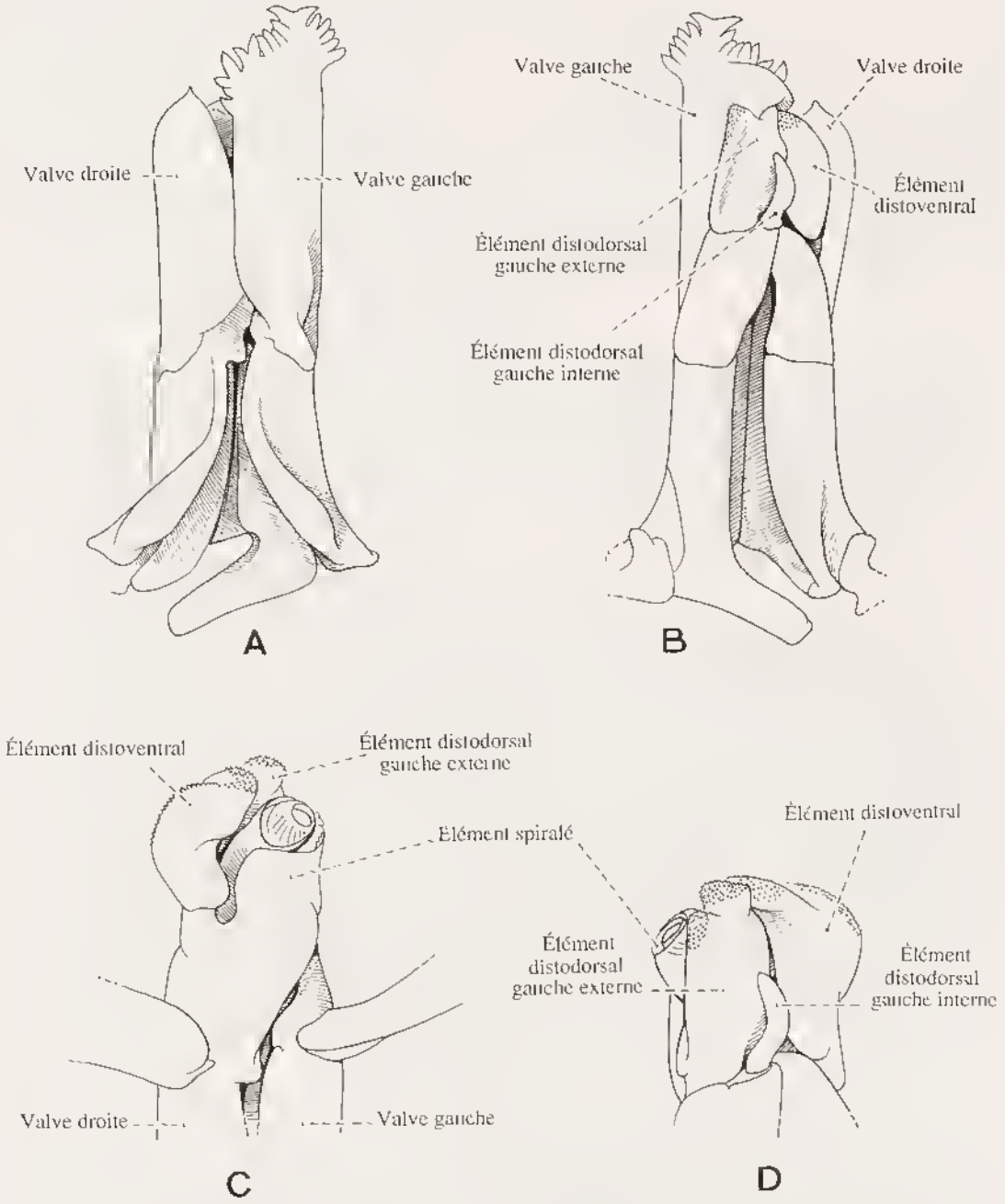

FIG. 2. — Termes utilisés pour la description du pétasma.
A, vue ventrale. B, vue dorsale. C, vue ventrale, valves écartées. D, vue dorsale de la partie distale, valves enlevées.

Source : MNHN, Paris

Au total 15 espèces sont étudiées ici. Il est remarquable de constater que seule l'une est nouvelle, alors que dans le groupe des *Metapenaeopsis* sans crête stridulante, plus nombreux il est vrai puisqu'il comprend 34 espèces, 15 d'entre elles, soit 44%, étaient nouvelles. Il est vrai que les espèces étudiées ici sont, dans l'ensemble, de plus grande taille que celles du groupe précédent, mais le phénomène n'en demeure pas moins inattendu.

CLÉS D'IDENTIFICATION

De même que dans nos travaux précédents, il nous a paru finalement préférable de proposer une clé pour les femelles et une clé pour les mâles. Il est bien évident que compte tenu des variations, souvent importantes, que présentent certains des caractères utilisés, l'utilisateur pourra parfois éprouver des difficultés, certaines limites de variations pouvant, dans des cas extrêmes, se superposer. Il nous semble toutefois que ceci doive être heureusement rare et se présenter, surtout, dans le cas de jeunes spécimens. Le recours aux nombreuses illustrations devrait permettre, espérons le, de se tirer alors d'embarras.

Les caractères utilisés dans ces clés conduisent à des groupements qui sont souvent très artificiels. Dans la suite du travail, nous avons cependant, dans un souci d'homogénéité avec nos publications précédentes, passé en revue les espèces dans l'ordre suivant lequel elles apparaissent dans la clé des femelles.

FEMELLES

1. Corps grêle. Sixième segment abdominal 2,4 fois plus long environ que le cinquième (les mesures étant prises au niveau des condyles d'articulation et jusqu'à l'extrémité de la dent de la face latérale du sixième segment). Appareil stridulant composé de 5 à 8 crêtes très petites, peu en relief et souvent difficiles à distinguer ..... ***M. sinuosa*** (p. 263)
— Corps robuste. Sixième segment abdominal 2,0 fois plus long environ que le cinquième. Appareil stridulant composé de crêtes bien marquées, souvent nombreuses **2**

2. Appareil stridulant composé de 5 ou 6 crêtes (exceptionnellement 4 ou 7) .... ***M. stridulans*** (p. 266)
— Appareil stridulant composé de plus de 7 crêtes **3**

3. Carène dorsale du troisième segment abdominal très large (rapport L/l voisin de 6), convexe transversalement et lisse. Espèce australienne. ..... ***M. fusca*** (p. 273)
— Carène dorsale du troisième segment abdominal peu large (rapport L/l compris entre 9 et 13), plate ou creusée d'un sillon **4**

4. Rostre nettement plus long que le pédoncule antennulaire, fortement recourbé vers le haut, portant habituellement 5 (très rarement 6) dents, largement espacées à partir de la quatrième (fig. 12). Plaque thélycale très large (rapport l/L au moins égal à 2) .... ***M. novaeguineae*** (p. 277)
— Rostre au plus aussi long (ou à peine plus long) que le pédoncule antennulaire, portant au moins 6 dents. Plaque thélycale avec un rapport l/L au plus égal à 2 ..... **5**

5. Appareil stridulant composé de 28 à 35 crêtes. Rostre portant 8 ou 9 dents. Carène dorsale du troisième segment abdominal creusée d'un sillon sur toute sa longueur. Plaque thélycale épaisse, peu large (rapport l/L voisin de 1,2), à bord antérieur très convexe (fig. 16) ..... ***M. dura*** (p. 281)
— Appareil stridulant composé de moins de 28 crêtes **6**

6. Épine ptérygostomienne bien développée (fig. 18 a) **7**
— Épine ptérygostomienne très réduite (fig. 31 a) ou modérément développée (fig. 29 a). **10**

7. Rapport l/L de la plaque thélycale voisin ou inférieur à 1 ..... **8**
— Rapport l/L de la plaque thélycale au moins égal à 1,5 ..... **9**

Source : MNHN, Paris

8. Plaque thélycale ayant la forme d'un as de pique (fig. 19 a). Rostre portant de 7 à 9 dents. Appareil stridulant composé de 16 à 26 (le plus souvent 22 ou 23) crêtes. Espèce sud-australienne ..... ***M. lindae*** (p. 284)
— Plaque thélycale à bord antérieur faiblement convexe (fig. 21). Rostre portant 6 ou 7 dents. Appareil stridulant composé de 13 à 18 crêtes. Espèce japonaise et taiwanaise. .... ***M. acclivis*** (p. 287)

9. Appareil stridulant composé de 10 à 17 crêtes. Rostre portant de 7 à 9 dents. Carène dorsale du troisième segment abdominal creusée d'un profond sillon sur toute sa longueur (fig. 23 c-d). Rapport l/L de la plaque thélycale voisin de 1,5-1,6 .... ***M. crassissima*** (p. 292)
— Appareil stridulant composé de 16 à 27 crêtes chez l'adulte (pas plus de 12, parfois, chez les très jeunes spécimens). Rostre portant 6 ou 7 dents. Carène dorsale du troisième segment abdominal plate ou légèrement creusée (fig. 25 b-c). Rapport l/L de la plaque thélycale compris entre 1,7 et 2,0 ..... ***M. barbata*** (p. 295)

10. Carène du troisième segment abdominal creusée sur toute sa longueur par un sillon large, profond et non ponctué (fig. 29 c-d) 11
— Carène du troisième segment abdominal non creusée sur toute sa longueur par un sillon large, profond et non ponctué (fig. 31 c, 34 c, 37 c) 12

11. Appareil stridulant composé de 13 à 25 crêtes (le plus souvent 16 à 19). Plaque intermédiaire du thélycum avec deux reliefs en forme de croissants symétriques. Expansions coxales des P5 très développées (fig. 30a) ..... ***M. toloensis*** (p. 301)
— Appareil stridulant composé de 8 à 16 crêtes (le plus souvent de 11 à 15). Plaque intermédiaire du thélycum sans reliefs obliques symétriques ou alors ceux-ci très peu marqués. Expansions coxales des P5 modérément développées (fig. 35 b) .... ***M. sinica*** (p. 315)

12. Rostre portant 9 ou 10 dents. ..... ***M. rosea*** (p. 305)
— Rostre portant moins de 9 dents 13

13. Carène du troisième segment abdominal étroite, creusée partiellement ou totalement d'un sillon plus ou moins marqué (fig. 34 c, 39 b, e) 14
— Carène dorsale du troisième segment abdominal assez large, plate ou très légèrement déprimée en gouttière, lisse ou ponctuée (fig. 37 c, 42 c) 15

14. Appareil stridulant composé de 8 à 13 (le plus souvent 9 ou 10) crêtes. Plaque intermédiaire du thélycum avec deux forts reliefs obliques symétriques (fig. 35 a) .... ***M. palmensis*** (p. 308)
— Appareil stridulant composé de 8 à 16 (le plus souvent 11 à 15) crêtes. Plaque intermédiaire du thélycum sans reliefs obliques symétriques (fig. 35 b) ou alors ceux-ci très peu marqués ..... ***M. sinica*** (p. 315)

15. Appareil stridulant composé de 10 à 14 crêtes ..... ***M. parapalmensis*** (p. 313)
— Appareil stridulant composé de 13 à 21 crêtes. ..... ***M. aegyptia*** (p. 320)

MÂLES

1. Corps gracile. Sixième segment abdominal 2,4 fois plus long environ que le cinquième (les mesures étant prises au niveau des condyles d'articulation et jusqu'à l'extrémité de la dent de la face latérale du sixième segment). Appareil stridulant composé de 2 à 3 crêtes très petites, peu en relief et souvent difficiles à distinguer (parfois même absentes, semble-t-il, chez les mâles) ..... ***M. sinuosa*** (p. 263)

Source : MNHN, Paris

— Corps robuste. Sixième segment abdominal 2.0 fois plus long environ que le cinquième. Appareil stridulant composé de crêtes bien marquées, souvent nombreuses **2**

2. Appareil stridulant composé de 5 ou 6 crêtes (exceptionnellement 4 ou 7) .... ***M. stridulans*** (p. 266)

— Appareil stridulant composé de plus de 7 crêtes **3**

3. Carène dorsale du troisième segment abdominal très large (rapport L/l voisin de 6), convexe transversalement et lisse. Espèce australienne. ..... ***M. fusca*** (p. 273)

— Carène dorsale du troisième segment abdominal peu large (rapport L/l compris entre 9 et 13), plate ou creusée d'un sillon **4**

4. Rostre nettement plus long que le pédoncule antennulaire, fortement recourbé vers le haut, portant habituellement 5 (très rarement 6) dents, largement espacées à partir de la quatrième (fig. 12). Pétasma avec une valve gauche se terminant par un bouquet de digitations charnues, parfois bi-ou même trifides; élément distodorsal gauche interne en forme de languette très allongée, presque aussi long que l'élément distodorsal gauche externe (fig. 14) ..... ***M. novaeguineae*** (p. 277)

— Rostre au plus aussi long (ou à peine plus long) que le pédoncule antennulaire, portant au moins 6 dents **5**

5. Appareil stridulant composé de 28 à 35 crêtes. Rostre portant 8 ou 9 dents. Carène dorsale du troisième segment abdominal creusée d'un sillon sur toute sa longueur. Pétasma avec une valve gauche un peu en forme de sabot de cheval; élément distodorsal gauche interne en forme de languette assez large, nettement plus courte que l'élément distodorsal gauche externe (fig. 17) ..... ***M. dura*** (p. 281)

— Appareil stridulant composé de moins de 28 crêtes **6**

6. Épine ptérygostomienne bien développée (fig. 18 a) **7**

— Épine ptérygostomienne très réduite (fig. 31 a) ou modérément développée (fig. 29 a). **10**

7. Pétasma avec une valve gauche à partie distale très massive, un peu en forme de sabot de cheval (fig. 19 b-c, 24 b-c, 30 b-c, e); élément distodorsal gauche externe entier ou très profondément échancré (fig. 19 d-e, 24 c, 30 g-h)..... **8**

— Pétasma avec une valve gauche à partie distale massive (fig. 33 b-c); élément distodorsal gauche externe faiblement bilobé (fig. 32 c)..... ***M. rosea*** (p. 305)

8. Élément distodorsal gauche externe divisé en deux dans sa partie distale par une très profonde échancrure (fig. 24 c, 30 g-h) **9**

— Élément distodorsal gauche externe entier, sans aucune échancrure (fig. 19 d-e)) .... ***M. lindae*** (p. 284)

9. Élément distodorsal gauche interne du pétasma en forme de longue languette recourbée vers l'extérieur et atteignant presque le niveau de l'élément distodorsal gauche externe (fig. 30 f). Appareil stridulant composé de 13 à 25 crêtes (le plus souvent de 16 à 19)..... ..... ***M. toloensis*** (p. 301)

— Élément distodorsal gauche interne du pétasma en forme de languette beaucoup plus courte que l'élément distodorsal gauche externe (fig. 24 c, e). Appareil stridulant composé de 10 à 17 crêtes (le plus souvent 13 ou 14) ..... ***M. crassissima*** (p. 292)

10. Valve gauche du pétasma nettement allongée et relativement grêle dans sa partie distale, portant des digitations assez peu nombreuses (fig. 28 a, 40 a) **11**

— Valve gauche du pétasma dans la plupart des cas moins allongée, toujours nettement plus massive et portant de nombreuses digitations (fig. 22 a, 36 a, 44 a) **12**

Source : MNHN, Paris

11. Élément distodorsal gauche interne du pétasma en forme de grande languette quadrangulaire dépassant très nettement l'élément distodorsal gauche externe (fig. 28 b). Appareil stridulant composé de 16 à 27 crêtes chez l'adulte (parfois pas plus de 12 chez les très jeunes) ..... ***M. barbata*** (p. 295)
— Élément distodorsal gauche interne du pétasma très réduit, en forme de petite oreille, infiniment plus petit que l'élément distodorsal gauche externe (fig. 40 c). Appareil stridulant composé de 8 à 16 crêtes (le plus souvent 11 à 15) ..... ***M. sinica*** (p. 315)

12. Élément distodorsal gauche interne du pétasma bien développé, quadrangulaire, à bords plus ou moins sinueux et portant sur sa face dorsale une forte côte sinueuse, nettement plus long que l'élément distodorsal gauche externe (fig. 22 c) ..... ***M. acclivis*** (p. 287)
— Élément distodorsal gauche interne très réduit, digitiforme, beaucoup plus court que l'élément distodorsal gauche externe 13

13. Valve gauche du pétasma portant, à son angle antérolatéral externe, des digitations serrées formant plus ou moins un lobule (fig. 44 a-b). Spinules des éléments distodorsal gauche externe et disloventral fortes (fig. 45 c). Appareil stridulant composé de 13 à 21 crêtes .... ***M. aegyptia*** (p. 320)
— Valve gauche du pétasma ne portant que de rares digitations à son angle antérolatéral externe (fig. 36 a-b). Spinules des éléments distodorsal gauche externe et distoventral de taille modeste (fig. 36 c, 38 c). Appareil stridulant composé de 8 à 14 crêtes..... 14

14. Élément distodorsal gauche externe du pétasma avec un épaulement dorsal peu convexe antérieurement et se raccordant suivant une faible sinuosité au petit lobe distoventral qui est entièrement recouvert de spinules (fig. 36 d) ..... ***M. palmensis*** (p. 308)
— Élément distodorsal gauche externe du pétasma avec un épaulement dorsal très convexe antérieurement et se raccordant suivant une forte sinuosité au petit lobe distoventral qui est divisé longitudinalement en deux parties accolées : l'une couverte de spinules, l'autre lisse (fig. 38 b, e) ..... ***M. parapalmensis*** (p. 313)

Metapenaeopsis sinuosa Dall, 1957

Fig. 3-4

Metapenaeopsis sinuosus Dall, 1957 : 176, fig. 14 A-F.
Metapenaeopsis sinuosa - Racek & Dall, 1965 : 35, fig. 2 F, pl. 10, fig. 1. — Starobogatov, 1972 : 401 (clé), pl. 9, fig. 105 a-b. — Burukovsky, 1974 : 34 (éd. 1983 : 44) (clé), fig. 43 f, 44 a-c. — Dall & Rothlisberg, 1990 : 73 (clé). — Dall, 1990 : 143 (liste).

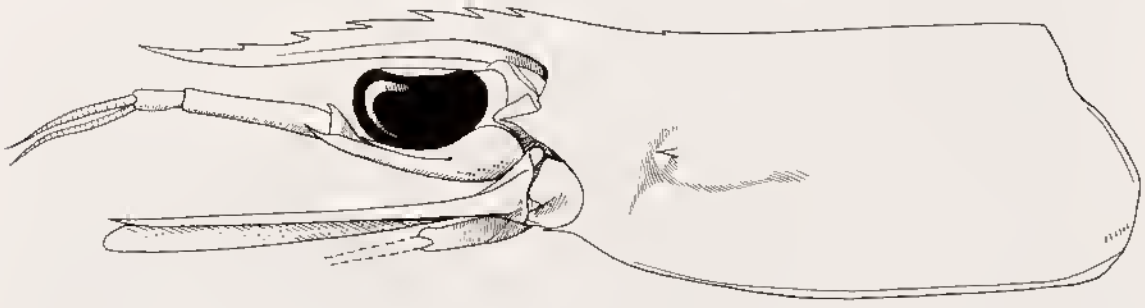

Fig. 3. — *Metapenaeopsis sinuosa* Dall, 1957, ♀ 7,9 mm, Australie, île Lindeman (AMS-P 14226) : partie antérieure du corps.

Source : MNHN, Paris

MATÉRIEL EXAMINÉ. — **Australie**. *Côte nord-est* : Ile Off Shore (Kennedy Sound), Cumberland Group, 16 m, chalutage de nuit, 5.09.1935, G. P. WHITLEY coll. : 1 ♂ 8,0 mm, holotype (AMS-P 12223). — Ile Lindeman, 20°26'S - 149°03'E, 11 m, dragage, fond corallien, 11.09.1935, W. DAKIN coll. : 1 ♂ 6,2 mm; 1 ♀ 7,9 mm (AMS-P 14226).

Côte nord : 11°57'S - 132°35'E, 5-16 m, 26.10.1977 : 5 ♂ 6,0 à 7,0 mm (NTM Cr-008797); 21 ♀ 5,0 à 8,8 mm (NTM Cr-008797a); 2 ♂ et 2 ♀ (MNHN-Na 12821). — 11°48'S - 132°25'E, 13 m, 17.01.1978, G. WHITE coll. : 8 ♀ 6,6 à 7,7 mm (NTM Cr-008798). — 11°53'S - 132°30'E, 16-18 m, 17.01.1978, G. WHITE coll. : 1 ♂ 5,6 mm; 1 ♀ 7,6 mm (NTM Cr-008799).

Cette espèce se caractérise par :

— le rostre long et sinueux (d'où le nom de l'espèce), orné de 7 dents, sans compter l'épigastrique.

— l'épine ptérygostomienne fine et longue.

— l'appareil stridulant composé de crêtes stridulantes très peu marquées et parfois même pratiquement absentes. Chez les femelles que nous avons examinées, on distingue habituellement de 5 à 8 crêtes, très petites, assez peu en relief et difficiles à distinguer, cachées comme elles le sont par les soies assez nombreuses et longues qui ornent la carapace. Chez les mâles, il semble que l'absence de crêtes soit fréquente (en tous cas, fréquemment, nous n'avons pu en distinguer), parfois on en distingue 2 ou 3.

— la carène du troisième segment abdominal très légèrement convexe transversalement, lisse ou avec quelques ponctuations, assez large dans sa partie postérieure, nettement moins dans sa partie antérieure (fig. 4 e-f).

— le sixième segment abdominal allongé, 2,4 fois plus long environ que le cinquième (les mesures étant prises au niveau des condyles d'articulation et jusqu'à l'extrémité de la dent de la face latérale du sixième segement).

— le thélycum (fig. 4 a), qui présente la disposition générale observée chez les *Metapenaeopsis* à appareil stridulant. La plaque thélycale est très large (rapport l/L un peu supérieur à 2), avec un bord antérieur à peine sinueux, dont la portion médiane est très légèrement convexe (DALL, 1957, y mentionne la présence de trois spinules qu'il représente sur sa figure et que nous n'avons pas retrouvées) et des bords latéraux arrondis. La zone intermédiaire présente une partie médiane très profondément déprimée longitudinalement et des parties latérales légèrement renflées, dont le bord externe porte de courtes soies, et à l'extérieur desquelles viennent se loger, dans des concavités, les expansions coxales des quatrièmes péréiopodes. La plaque transversale a un bord antérieur presque droit et se recourbe vers l'avant à ses extrémités. On observe une paire de longues épines, dont les bases sont bien séparées, entre les deuxièmes péréiopodes et une paire de gros tubercules entre les troisièmes.

— le pétasma (fig. 4 b-c), qui présente des valves de taille très voisine; il semble que ce soit tantôt la gauche qui soit la plus longue (comme c'est le cas chez les autres espèces), tantôt la droite. La valve gauche a une extrémité qui s'étire en pointe aiguë qui peut être simple (cas du spécimen dessiné) ou légèrement divisée. La valve droite a sa région distale arrondie sans aucune digitation, mais avec parfois une petite spinule distale. L'élément distodorsal gauche interne est très peu développé (sa longueur est proche du tiers de celle de l'élément distodorsal gauche externe) et se réduit à une petite languette plate ou creusée en cuillère suivant les spécimens, et ornée de trois soies (fig. 4 d). L'élément distodorsal gauche externe est large, subrhomboïdal. Le lobe distoventral est renflé à son extrémité et a un peu la forme d'une allumette; sa partie distale est densément couverte de spinules peu développées; sa face interne est creusée en gouttière, sauf à son extrémité.

COLORATION. — Inconnue.

TAILLE. — L'espèce semble très petite et ne guère dépasser 45 mm de longueur totale (Lc = 8,8 mm).

REMARQUES. — La petite taille de cette espèce et le fait qu'elle semble vivre sur des fonds coralliens, difficiles d'accès aux engins de capture, expliquent vraisemblablement la rareté des récoltes qui en ont été faites.

DALL (1957), qui n'avait pas remarqué la présence d'un appareil stridulant, compte tenu de la forme du rostre et de celle du sixième segment abdominal, avait rapproché cette espèce de celles, d'eau profonde, du groupe *philippi*, dont elle se rapproche également par la forme du lobe distodorsal gauche externe du pétasma. La présence d'un appareil stridulant et la forme du thélycum rangent toutefois cette espèce, sans hésitation, comme RACEK & DALL (1965) l'ont fait observé par la suite, parmi les espèces étudiées dans ce travail.

Source : MNHN, Paris

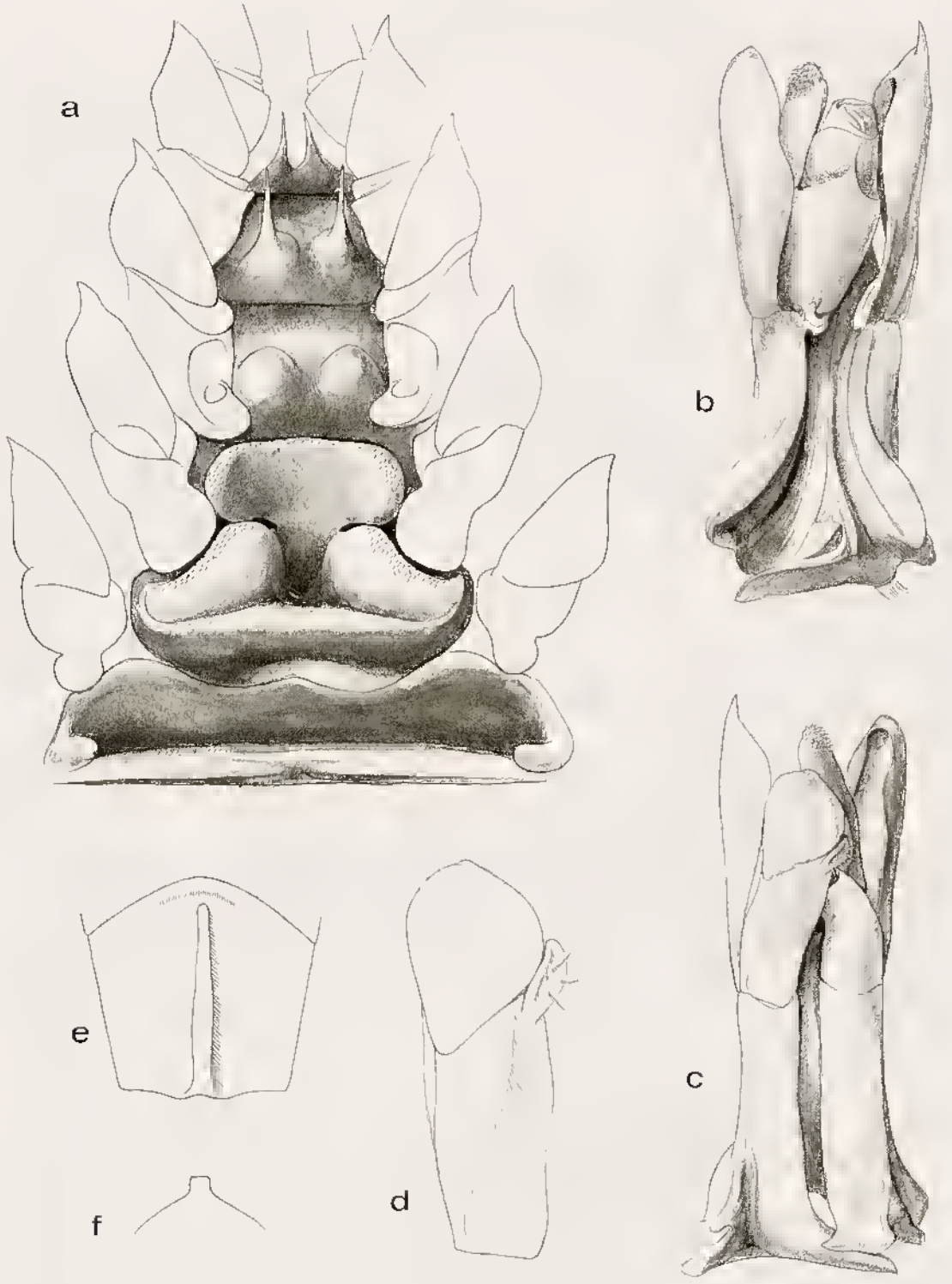

FIG. 4. — *Metapenaeopsis sinuosa* Dall, 1957 : **a**, ♀ 7,9 mm, Australie, île Lindeman (AMS-P 14226) ; vue ventrale des sternites thoraciques V-VIII. — **b-d**, ♂ 6,2 mm, *ibidem* (AMS-P 14226), Pétasma : **b**, vue ventrale; **c**, vue dorsale; **d**, éléments distodorsaux gauches externe et interne; — **e-f**, ♀ 7,6 mm, Australie, 11°53'S - 132°30'E (NTM-Cr 008799) : troisième segment abdominal, vue dorsale et coupe transversale.

Source : MNHN, Paris

DISTRIBUTION. — Cette espèce n'est encore connue que de l'Australie où elle a été récoltée sur la côte nord (golfe Van Diemen) et la côte nord-est, entre 20°26'S et 20°40'S (Grande Barrière : îles Lindeman et Off Shore), à des profondeurs comprises entre 11 et 18 m.

Metapenaeopsis stridulans (Alcock, 1905)

Fig. 5-8

Metapeneus stridulans Alcock, 1905 : 518 (liste), 526; 1906 : 27 (en partie), fig. 14, 14 a, 14 c-d. Non fig. 14 b = *M. toloensis*, Hall, 1962.

Penaeopsis stridulans - DE MAN, 1911 : 9, 54 (listes). Non : 65 = différentes autres espèces, voir remarques. — BALSS, 1924 : 44 (liste).

Erithropenaeus stridurans (sic) - YOKOYA, 1941 : 54, pl. 1, fig. 11.

Metapenaeopsis stridulans - NATARAJ, 1942 : 468. — HALL, 1961 : 105, fig. 2, pl. 21, fig. 21, 23; 1962 : 32, fig. 117-117 b. — RACEK & DALL, 1965 : 32, fig. 2 E, 4 A-C, pl. 9, fig. 5. — DE BRUIN, 1965 : 84; 1970 : 71 (liste). — GEORGE, 1969 : 25; 1972 : 90, 91. — GEORGE & MUTHU, 1970 : 289, fig. 6-10. — MUTHU, 1971 : 154. — LEE, 1972 : 271, 272, 273 (listes). — RAPSON & McINTOSH, 1972 : 24 (clé), 62, 83. — STAROBOGATOV, 1972 : 375, 401 (clé), pl. 9, fig. 106 a-b. — TIRMIZI & BASHIR, 1973 : 13, fig. 11-13. — MISTAKIDIS, 1973 : 24. — BURUKOVSKY, 1974 : 36 (clé) (éd. 1983 : 47), fig. 47 a-c. — LUMUBOL, 1974 : 59, pl. 3, fig. 23, pl. 7, fig. 23, pl. 9, fig. 23. — CHAITIAMVONG & RATANA-ANANTA, 1974 : 17, 18, pl. 24. — WEAR & STIRLING, 1974 : 100, 103, 107. — MOTOH, 1975 : 9, fig. 5, pl. 2, fig. 1. — KURIAN & SEBASTIAN, 1976 : 82 (clé), 96. — HASSAN, 1978 : 389. — JOHNSON, 1979 : 5. — SILAS & MUTHU, 1979 : 85. — HOLTHUIS, 1980 : 19. — NAAMIN, 1980 : 58 et 60 (listes). — CHAITIAMVONG, 1980 : 95 (liste). — NAIYANETR, 1980 : 15. — LOVETT, 1981 : 40 (clé), fig. 81 a-d. — MIQUEL, 1981a : 2 (liste); 1981b : 5 (clé); 1984b, fiche PEN Mela 16, 5 fig. n.n., 1 carte. — TORO & MOOSA, 1984 b : 15 (liste). — MOTOH & BURI, 1984 : 75, fig. 50, 51 A-G, 54 A. — LIU, ZHONG *et al.*, 1988 : 221, fig. 135. — GHAMRAWY, 1988 : 118 (en partie), fig. 4.3 A-B. Non fig. 4.3 C = autre espèce, voir remarques. — LEELAPIYANART, 1989 : 221, fig. 53 a-c, 81 c (photo coul.). — MOTOH, 1990 : 97, pl. 2 a (photo coul.), voir remarques. — DALL & ROTHLISBERG, 1990 : 73 (clé). — DALL, 1990 : 143. — CHAITIAMVONG & SUPONGPAN, 1992 : 26 (clé), pl. 16 (photo coul.).

Metapenaeopsis studulons (sic) - MIQUEL, 1981c : 7 (carte).

? *Metapenaeopsis stridulans* - TATTERSALL, 1921 : 366. — HALL, 1966 : 99 (1964 : 12) (= presque certainement *M. aegyptia* Galil & Golani, 1990).

? *Metapenaeopsis tchekunovae* Starobogatov, 1972 : 413, pl. IX, fig. 107.

Non *Metapenaeus stridulans* - BORRADAILE, 1910 : 257 (= un mélange de *M. toloensis* Hall, 1962, *M. sinica* Liu & Zhong, 1988, *M. aegyptia* Galil & Golani, 1990).

Non *Penaeopsis stridulans* - DE MAN, 1911 : 65 (= un mélange d'espèces sans *M. stridulans*, voir remarques); 1913, pl. 7, fig. 20 a [= *M. palmensis* (Haswell, 1879)], fig. 20 b [= *M. barbata* (de Haan, 1844)].

Non *Penaeopsis stridulans* - PESTA, 1912 : 346 [= *M. palmensis* (Haswell, 1879)]; 1915 : 104 (mélange d'espèces, sans *M. stridulans*, voir remarques).

Non *Penaeopsis stridulans* - BALSS, 1915 : 10, *fide* BURKENROAD, 1959; 1929 : 25 (= *M. aegyptia* Galil & Golani, 1990).

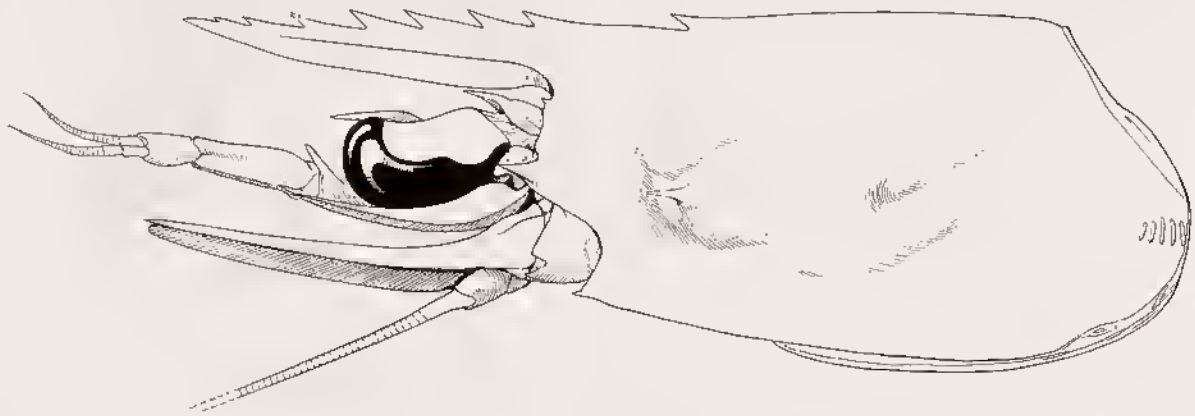

FIG. 5. — *Metapenaeopsis stridulans* Alcock, 1905, ♀ 18,0 mm, Nouvelle-Calédonie, baie de Saint Vincent (MNHN-Na 12799) : partie antérieure du corps.

Source : MNHN, Paris

MATÉRIEL EXAMINÉ. — **Inde**. Madras, J. C. MIQUEL coll., 15.03.1976 : 1 ♂ 13,5 mm; 2 ♀ 17,0 et 21,0 mm (USNM 255461).

Sri-Lanka. Côte est, au large de Mullaitivu, G. H. P. DE BRUIN coll. : 1 ♂ 13,3 mm.

Birmanie. *"Investigator"* : golfe de Martaban : 1 ♂ 12,2 mm; 1 ♀ 14,8 mm (USNM, provenance Indian Museum).

"Anton Bruun" : Cruise 1, st. 42-63, 15°08'N - 94°54'E, 35 m, 1.04.1963 : 8 ♂ 12,5 à 15,1 mm; 5 ♀ 14,3 à 18,0 mm (MNHN).

Thaïlande. *Côte ouest* : Trang, 30.07.1982 : 1 ♂ 13,7 mm; 4 ♀ 15,0 à 16,8 mm (MNHN-Na 6923). — Phuket, 22 m, 2.12.1990 : 4 ♂ 10,4 à 10,6 mm. — *Côte est* : Songkhla Province, 9.06.1989, P. NAIYANETR pres. : 4 ♂ 10,9 à 11,6 mm. — *Ibidem*, 17.07.1990, P. NAIYANETR pres. : 4 ♂ 10,6 à 12,6 mm; 3 ♀ 11,8 à 15,0 mm. — Ranong Province, 9.03.1991, P. NAIYANETR pres. : 2 ♂ 12,0 et 12,0 mm; 3 ♀ 13,2 à 16,7 mm (MNHN-Na 12804).

Singapour. Angler Buoy : 2 ♂ juv. 7,2 et 8,6 mm (MNHN-Na 274).

Vietnam. Golfe du Tonkin : 19°20,0'N - 107°34,0'E, 60 m, *"Orlik"*, 20.01.1960 : 1 ♀ 18,3 mm (MMSU).

Chaifon, Usine de traitement de crevettes, N. A. ZARENKOV coll., 1960 : 2 ♂ 12,4 et 15,7 mm (MMSU).

Indonésie. Nord de Java, Pekalongan : 2 ♂ 14,1 et 14,7 mm; 1 ♀ 18,2 mm.

CORINDON : st. BT 201, 1°11'S - 117°06'E, 21 m, 30.10.1980 : 1 ♀ 10,8 mm. — St. BT 205, 1°08'S - 117°18'E, 49 m, 30.10.1980 : 5 ♂ 12,1 à 15,1 mm; 3 ♀ 13,2 à 16,9 mm (MNHN-Na 12806).

Nouvelle-Calédonie. Baie de Saint Vincent, 21°57'S - 166°02'E, 5-9 m, F. CONAND coll., 8.12.1982 : 1 ♂ 12,7 mm; 1 ♀ 18,0 mm (MNHN-Na 12799); 2 ♀ 16,8 et 17,0 mm (MNHN-Na 7335). — *Ibidem*, 21°58,1'S - 166°01,8'E, 11 m, M. KULBICKI coll., 6.12.1984 : 2 ♂ 10,8 et 13,0 mm; 2 ♀ 15,4 et 16,8 mm (MNHN-Na 7336). — *Ibidem*, 21°58,2'S - 166°01'E, 10 m, M. KULBICKI coll., 6.12.1984 : 12 ♂ 10,0 à 13,8 mm; 26 ♀ 11,9 à 17,6 mm (MNHN-Na 7337); 1 ♂ 13,6 mm (MNHN-Na 12803). — *Ibidem*, 21°58,3'S - 166°01'E, 6 m, M. KULBICKI coll., 6.12.1984 : 33 ♂ 10,0 à 14,1 mm; 68 ♀ 8,6 à 18,1 mm (MNHN-Na 7338). — *Ibidem*, M. KULBICKI coll., 11.08.1985 : 6 ♂ 10,5 à 12,0 mm; 11 ♀ 11,1 à 15,9 mm.

LAGON. — *Lagon sud-ouest* : st. 4, 22°22,5'S - 166°20,7'E, 9 m, 21.05.1984 : 16 ♂ 10,4 à 14,1 mm; 35 ♀ 12,0 à 18,9 mm.

Lagon est : st. 852, 20°42,7'S - 165°06,3'E, 34 m, 12.01.1987 : 1 ♂ 8,2 mm.

Lagon nord-ouest : st. 928, 20°44,8'S - 164°22,6'E, 7-10 m, chalutage, 27.04.1988 : 2 ♀ 11,1 et 12,3 mm. — St. 1059, 20°15,2'S - 164°14,4'E, 7-9 m, chalutage, 5.05.1988 : 1 ♂ 12,0 mm. — St. 1060, 20°14,3'S - 164°15,4'E, 12-14 m, chalutage, 5.05.1988 : 29 ♂ 7,8 à 11,8 mm; 25 ♀ 8,3 à 15,1 mm. — St. 1061, 20°12,4'S - 164°12,4'E, 13-17 m, chalutage, 5.05.1988 : 1 ♂ 9,0 mm; 1 ♀ 12,3 mm.

Pakistan. Port de pêche de Karachi, 12.03.1969 : 1 ♂ 14,7 mm; 1 ♀ 14,5 mm (USNM 334252).

Golfe d'Oman. *"Anton Bruun"* : Cruise 4B, st. 258 A, 26°58'N - 56°43'E, 33-35 m, 1.12.1963 : 1 ♂ 11,8 mm; 4 ♀ 12,3 à 20,0 mm (USNM).

Golfe Persique. C. E. DAWSON coll., 1956 : 3 ♂ 8,7 à 11,4 mm (USNM 106084).

"Akademic" : st. PG-13 Ku, 29°13,587'N - 49°53,955'E, 41 m, 10.12.1991 : 23 ♂ 6,0 à 15,7 mm; 31 ♀ 5,5 à 18,5 mm (SMF, sauf 3 ♂ et 3 ♀ MNHN). — St. PG-16 Ku, 28°49,661'N - 49°48,506'E, 51 m : 13 ♂ 14,7 à 15,2 mm; 10 ♀ 10,0 à 18,3 mm (SMF). — St. PG 21 Ku, 29°11,508'N - 49°31,040'E, 39 m, 12.12.1991 : 3 ♂ 8,0 à 14,0 mm; 6 ♀ 13,5 à 17,5 mm (SMF). — St. PG 22 Ku, 28°56,494'N - 49°43,812'E, 45 m, 14.12.1991 : 6 ♂ 5,0 à 18,5 mm; 12 ♀ 5,5 à 18,5 mm (SMF). — St. PG-28 Ku, 28°50,550'N - 50°07,668'E, 54 m, 17.12.1991 : 3 ♀ 9,8 à 17,6 mm (SMF).

Îles Bahrein. A. WHITE coll., mai 1967 : 1 ♂ 11,0 mm; 2 ♀ 13,4 et 14,6 mm (MNHN). — J. C. MIQUEL coll., 1979 : 1 ♀ 17,2 mm (RMNH 33805).

Cette espèce se caractérise par :

— le rostre droit ou très légèrement recourbé vers le haut, plutôt long (son extrémité se situe entre la base et l'extrémité du troisième article du pédoncule antennulaire) et portant le plus souvent 7, parfois 6, très rarement 8 dents, sans compter l'épigastrique.

— l'épine ptérygostomienne petite.

— l'appareil stridulant qui compte 5 ou 6 crêtes (parfois 4 d'après HALL, 1961, et DE BRUIN, 1965), longues (à l'exception des antérieures) et bien séparées les unes des autres. Ces crêtes sont placées assez haut sur la carapace (au 6/10 environ, à partir du bord dorsal).

— la carène dorsale du troisième segment abdominal bien en relief, étroite et creusée d'un sillon longitudinal bien marqué (fig. 8 c).

— le thélycum (fig. 6 a) dont la plaque transversale est large (rapport l/L compris entre 1,55 et 1,75). Les expansions coxales des P4 sont bien écartées l'une de l'autre, laissant la zone intermédiaire du thélycum bien dégagée. Cette dernière est concave et lisse dans sa partie centrale, ses parties latérales portent chacune un renflement couvert de soies qui n'est marqué que chez les grands spécimens. La plaque transversale forme un

Source : MNHN, Paris

bourrelet dessinant un arc dont les extrémités sont régulièrement arrondies. Les réceptacles séminaux s'ouvrent sur les côtés de la plaque intermédiaire; leurs ouvertures sont cachées par les expansions coxales des quatrièmes péréiopodes. Une paire de longues épines se trouve sur le sternum entre les deuxièmes péréiopodes et une paire de renflements arrondis entre les troisièmes.

— le pétasma (fig. 6 b-c) qui présente une valve gauche beaucoup plus allongée que la droite avec, dans sa partie distale, une dizaine de digitations dont la taille croît du côté interne au côté externe; cette valve coiffe en grande partie l'élément spiralé. La valve gauche ne recouvre que très partiellement le lobe distoventral; son extrémité est arrondie et porte un petit diverticule apical, habituellement bifide. L'élément distodorsal gauche interne est en forme de languette allongée (il dépasse nettement l'élément spiralé et l'élément distoventral) à bords latéraux légèrement sinueux, à extrémité arrondie et déportée du côté externe. L'élément distodorsal gauche externe, aplati en lamelle, est nettement plus court que l'interne; en vue dorsale, il montre une partie distale régulièrement arrondie (fig. 6 e); en vue externe il présente une expansion dorsale modérée (fig. 6 f). Le lobe distoventral est recourbé à angle droit du côté interne et présente une forte expansion à extrémité arrondie qui s'appuie contre l'élément spiralé et vient buter contre le lobe distodorsal gauche externe; en arrière de cette expansion s'en trouve une autre bien moins développée (fig. 6 e).

COLORATION (d'après MTQUEL, 1984b). — Elle varie du blanc au brun-rouge avec des marbrures dont la couleur va du rouge au brun foncé. Les péréiopodes sont colorés en rouge plus ou moins vif, sauf à leur base. Les uropodes sont rouges ou bruns, sauf sur leur tiers basal ainsi souvent qu'à leur extrémité.

LEELAPIYANART (1989, fig. 81b), MOTOH (1990, pl. 11 a), CHAITIAMVONG et SUPONGPAN, (1992, pl. 16) ont publié, chacun, une photo en couleur de cette espèce. Je me demande toutefois si celle de MOTOH ne concerne pas *M. palmensis* plutôt que *M. stridulans*.

TAILLE. — Une femelle atteint une longueur totale de 86 mm (Lc = 18,9 mm). DE BRUIN (1965) mentionne une longueur maximale de la carapace de 20 mm pour les femelles et 16 mm pour les mâles et plusieurs auteurs donnent 100 mm comme longueur totale maximale.

REMARQUES. — La description que nous avons donnée ci-dessus est basée sur du matériel provenant de Thaïlande. Elle s'applique parfaitement aux spécimens en provenance d'Indonésie, du Viet-Nam, de Singapour et du Sri-Lanka que nous avons pu examiner. Les dessins détaillés, publiés par TIRMIZI et BASHIR (1973), montrent par ailleurs que les spécimens du nord de la mer d'Arabie sont bien identiques à ceux que nous avons décrits.

Les spécimens de Nouvelle-Calédonie, par contre, présentent des différences un peu troublantes par rapport à ceux provenant de Thaïlande. C'est ainsi que :

— l'appareil stridulant ne comprend presque toujours que 5 crêtes (alors qu'en Thaïlande nous avons relevé environ 40% de spécimens portant 6 crêtes).

— la carène du troisième segment abdominal est proportionnellement nettement plus large et seulement légèrement creusée en gouttière, sans véritable sillon (fig. 8 b).

— la plaque du thélycum est proportionnellement un peu plus haute (rapport l/L compris entre 1,4 et 1,6).

— la valve gauche du pétasma est plus étirée et les digitations distales sont plus développées.

— l'élément distodorsal gauche interne du pétasma est proportionnellement plus large et nettement quadrangulaire (fig. 7 f-g).

On doit noter ici que RACEK et DALL (1965) ont déjà mentionné les variations de la carène dorsale du troisième segment abdominal (soit étroite et avec un sillon bien marqué, soit large et seulement légèrement creusée en gouttière), la première forme ayant été trouvée par ces auteurs au nord du Kalimantan, la seconde en Nouvelle-Guinée. De même, sur les figures du pétasma d'un spécimen en provenance de la Nouvelle-Guinée que ces auteurs publient, la forme large et quadrangulaire du lobe distodorsal interne gauche apparaît bien (mais les digitations de la valve gauche apparaissent peu développées).

Un autre problème est posé par les spécimens en provenance du golfe Persique. Nous avons pu examiner deux lots de récoltes :

— Le premier est composé des récoltes faites par l'*"Akademic"* dans le nord du golfe Persique. Composé de 5 récoltes, il comprend au total 45 mâles et 62 femelles. Ces spécimens correspondent bien à la description de

Source : MNHN, Paris

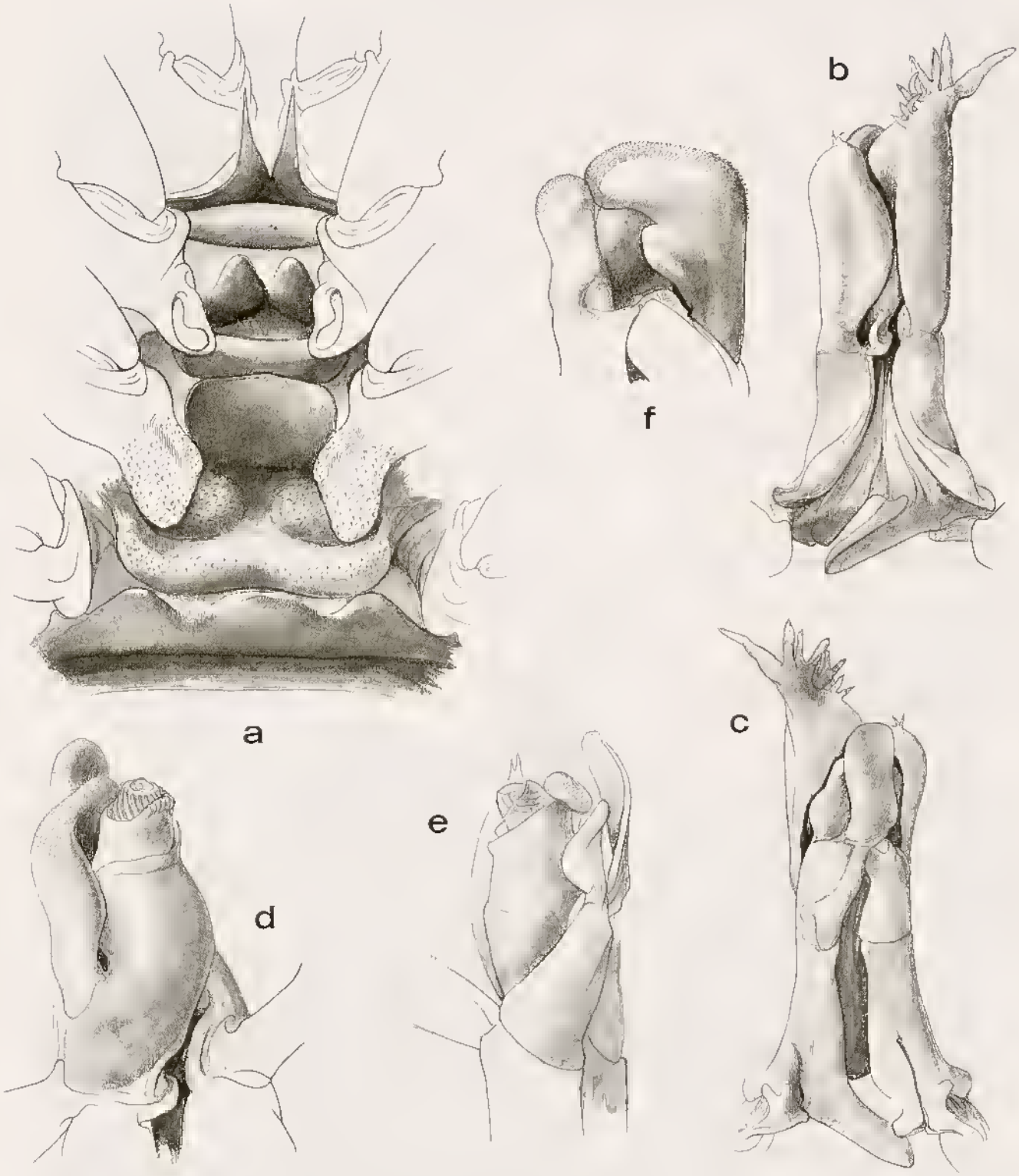

FIG. 6. — *Metapenaeopsis stridulans* Alcock, 1905, Nouvelle-Calédonie, baie de Saint Vincent (MNHN-Na 12799) : **a**, ♀ 18,0 mm, vue ventrale des sternites thoraciques V-VIII. — **b-e**, ♂ 12,7 mm, pétasma : **b**, vue ventrale; **c**, vue dorsale; **d**, vue ventrale de la partie distale, légèrement de biais, les valves écartées; **e**, vue latérale gauche de la partie distale, valve gauche écartée; **f**, vue dorsale de la partie distale, légèrement de biais, l'élément dorsodistal gauche interne enlevé et les valves non représentées.

Source : MNHN, Paris

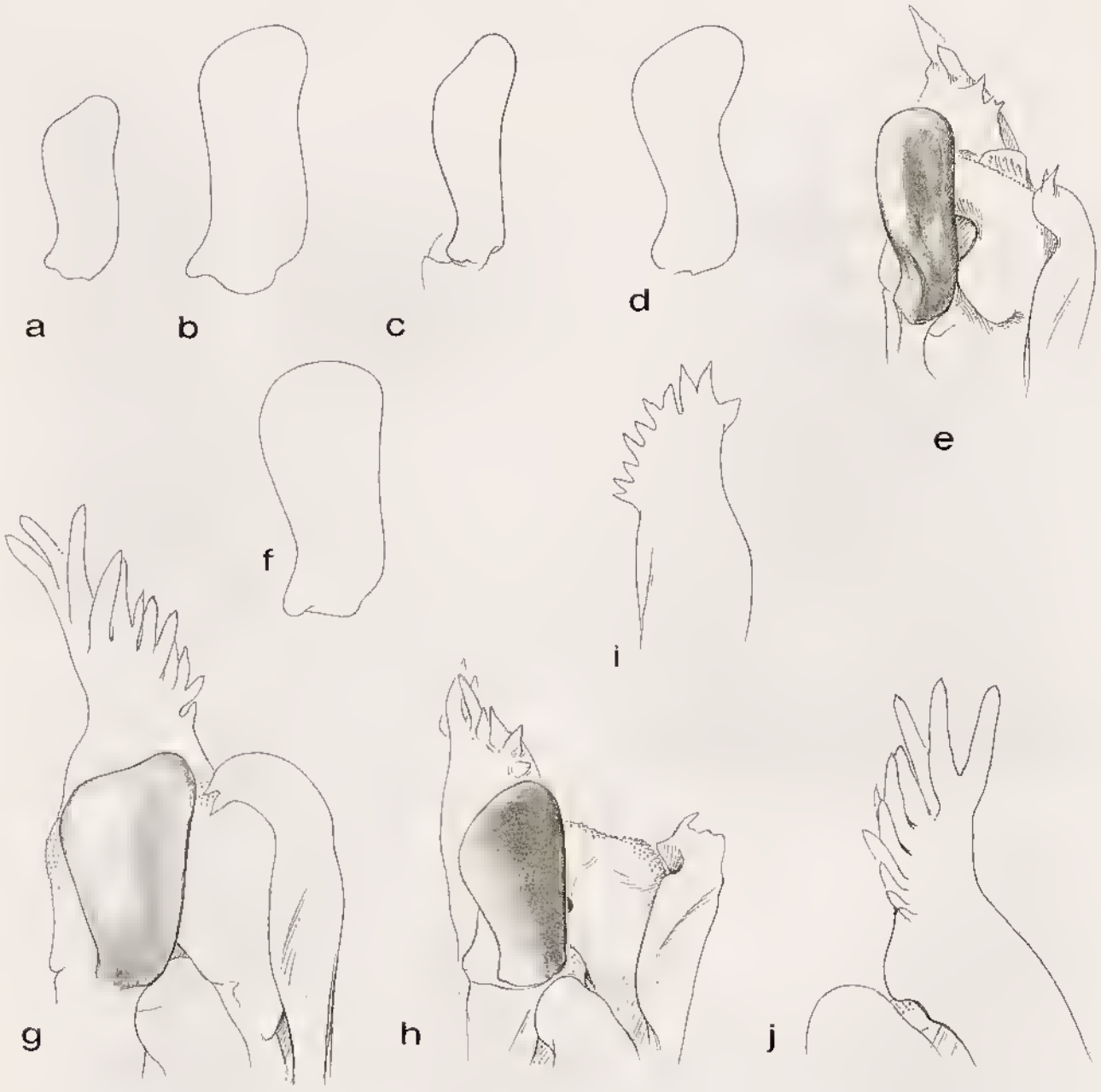

FIG. 7. — *Metapenaeopsis stridulans* Alcock, 1905, **a-d** : variations de la forme de l'élément distodorsal gauche interne en fonction des provenances géographiques : **a-b**, ♂ 12,0 et 15,5 mm, golfe Persique, *"Akademic"*, st. PG 13 Ku (SMF); **c**, ♂ 12,5 mm, Thailande (MNHN-Na 12805); **d**, ♂ 13,5 mm, Thailande (MNHN-Na 6923); **e**, ♂ 15,1 mm, Indonésie (MNHN-Na 12806); **f**, ♂ 13,6 mm, Nouvelle-Calédonie (MNHN-Na 12803); **g**, ♂ 13,6 mm, Nouvelle-Calédonie (MNHN-Na 7337); **h**, ♂ 10,8 mm, golfe Persique (WAM). — **i-j** : partie distale de la valve gauche : **i**, ♂ 12,5 mm, Thailande (MNHN-Na 12805); **j**, ♂ 13,6 mm, Nouvelle-Calédonie (MNHN-Na 12803).

M. stridulans que nous avons donnée ci-dessus. On notera que leur appareil stridulant est composé le plus souvent de 6 crêtes (les appareils stridulants à 5 crêtes se trouvant essentiellement chez les petits spécimens), le rapport largeur/longueur de la plaque thélycale est compris entre 1,45 et 1,60, le lobe distodorsal gauche interne est assez peu large, légèrement sinueux (fig. 7 a-b), les digitations distales de la valve gauche du pétasma très bien développées. Ces spécimens nous paraissent pouvoir être identifiés à *M. stridulans* sans hésitation véritable.

Source : MNHN, Paris

— Le deuxième lot comprend trois récoltes : l'une composée d'un mâle et deux femelles, l'autre d'une femelle, et provenant toutes deux des îles Bahrein; la troisième renferme trois mâles dont le lieu exact de récolte, dans le golfe Persique, est inconnu. Ces spécimens se caractérisent par :

— un appareil stridulant composé le plus souvent de 7 crêtes (les comptes relevés sur les sept spécimens sont : 6-6, 6-7, 6-7, 7-7, 7-7, 7-7 et 7-8).

— la carène du troisième segment abdominal plutôt étroite et avec un sillon bien marqué (comme chez les spécimens de Thaïlande).

— le rapport l/L de la plaque thélycale compris entre 1,45 et 1,65 (comme chez les spécimens de Nouvelle-Calédonie).

— l'élément distodorsal gauche interne du pétasma large et plutôt quadrangulaire (comme chez les spécimens néo-calédoniens) chez 3 mâles, mais assez étroit et sinueux, comme sur la figure 7 c, chez le quatrième.

— les digitations distales de la valve gauche du pétasma très bien développées.

Ce n'est que chez ces spécimens que nous avons observé un appareil stridulant composé de plus de 6 crêtes. RACEK & DALL mentionnent que l'appareil stridulant peut compter jusqu'à 8 crêtes. Il est vraisemblable que ce chiffre provient de la littérature et non d'observations personnelles. Sur la figure de la carapace qu'ils publient, l'appareil stridulant comporte 5 crêtes.

Il nous est difficile de tirer des conclusions bien nettes de ces observations, compte tenu de l'importance des variations observées dans une même population. Il est possible toutefois que l'on puisse être amené, à la faveur de nouvelles récoltes, à distinguer 3 sous-espèces chez *M. stridulans* :

— l'une *M. stridulans stridulans* Alcock, 1905, se trouvant du golfe Persique à l'Indonésie et au sud-ouest de la mer de Chine.

— une autre *M. stridulans orientalis* subsp. nov., peuplant la Nouvelle-Guinée, la Nouvelle-Bretagne et la Nouvelle-Calédonie et se distinguant essentiellement par la carène dorsale de son troisième segment abdominal large et sans sillon net, un appareil stridulant composé le plus souvent de 5 crêtes et le lobe distodorsal gauche interne du pétasma proportionnellement large.

— une troisième, *M. stridulans occidentalis* subsp. nov., se trouvant dans le golfe Persique, en même temps que *M. stridulans stridulans*, et se distinguant essentiellement par un appareil stridulant composé le plus souvent de 7 crêtes.

DE MAN (1911, 1913), étudiant le matériel récolté par la *"Siboga"*, a identifié 18 récoltes à *M. stridulans*. Or il semble que, curieusement, aucune de ces récoltes ne renferme de spécimen appartenant à cette espèce, pourtant très commune dans la région prospectée par le *"Siboga"*. Ces récoltes ont été déposées au Zoologisch Museum d'Amsterdam où nous nous sommes rendu pour les examiner. Malheureusement, seules 11 d'entre elles ont été retrouvées. M. D. BURKENROAD, lorsqu'il est venu à Amsterdam en 1938, a examiné ces récoltes et une étiquette de sa main indique qu'il a retiré certaines d'entre elles pour les mettre dans un autre bocal qu'il n'a pas été possible de retrouver. Compte tenu des récoltes que nous avons pu examiner (st. 2, 19, 33, 47, 53, 64, 205, 213, 258, 296, 313) et des indications, souvent assez détaillées, données par DE MAN dans son travail, les espèces composant ces récoltes sont :

— *M. palmensis* (Haswell, 1879) qui compose les récoltes des stations 2 (1 ♂, 2 ♀), 19 (1 ♂, 1 ♀), 33 (2 ♂, 1 ♀), 53 (1 ♂), 179 (1 ♂), 205 (1 ♀), 213 (1 ♂), 320 (1 ♀), ainsi probablement que celle de la station 258 (2 ♂ juvéniles) et une partie de celle de la station 273 (1 ou 2 ♀).

— *M. barbata* (de Haan, 1844) qui compose les récoltes des stations 162 (1 ♂ juvénile, 2 ♀ dont une juvénile) et 296 (1 ♂ juvénile, 1 ♀), ainsi vraisemblablement que celle des stations 163 (1 ♂ juvénile) et 273 (8 spécimens).

— *M. parapalmensis* qui compose les récoltes des stations 64 (3 ♂, 3 ♀) et 313 (5 ♂, 5 ♀).

Deux récoltes demeurent non identifiées, les spécimens les composant étant trop jeunes : celles des stations 47 (1 très jeune ♂) et 164 (1 ♀ juvénile).

TATTERSALL (1921) a mentionné *M. stridulans* en mer Rouge. Son matériel semble avoir disparu : il ne se trouve ni au British Museum à Londres, ni au Manchester Museum où le matériel de TATTERSALL est le plus

Source : MNHN, Paris

souvent déposé. Il semble, toutefois, qu'il y ait de grandes chances pour que ce matériel soit identifiable à *M. aegyptia* Galil & Golani, 1990.

GHAMRAWY (1988) signale *M. stridulans* du golfe Persique. Sa description mentionne un appareil stridulant comptant de 5 à 12 stries, ce qui implique un mélange d'espèces, comprenant au moins une espèce autre que *M. stridulans*. D'après la figure 4.3 C (pétasma), l'autre espèce doit vraisemblablement être *M. aegyptia*, même si le nombre de crêtes de l'appareil stridulant indiqué (12) ne convient guère.

Enfin mentionnons que PESTA (1915), sous l'appellation *Penaeopsis stridulans*, a confondu plusieurs espèces dont aucune n'est l'espèce d'ALCOCK. Nous avons en effet pu réexaminer une partie du matériel de PESTA et constater que la femelle du Japon (*"Erler"*, 1875), les six mâles et la femelle de Hongkong (*"Novara"*, 1857/59), le mâle et les trois femelles de "? Sydney" (*"Saida"*, 1886) sont des *M. palmensis* (Haswell), le mâle de Yokohama (*"Aurora"*, 1896) est une *M. acclivis* (Rathbun), tandis que les spécimens de la mer Rouge sont des *M. aegyptia* Galil & Golani. Le spécimen récolté par le *"Donau"* à Osima (il faut vraisemblablement lire Oshima au Japon, localité où le *"Donau"* a très vraisemblablement fait escale, L. B. HOLTHUIS *in litt.*), pose un problème : il a été identifié *"M. nov. sp. nearest novaeguineae"* par BURKENROAD en 1938, puis *M. rosea* Racek & Dall par RACEK en 1965; cette dernière identification paraît peu vraisemblable puisque *M. rosea* est une espèce connue uniquement du nord de l'Australie, du sud de l'Irian Jaya et de la Papouasie Nouvelle-Guinée. Il est évidemment possible aussi que le spécimen soit bien une *M. rosea* mais que l'étiquette soit inexacte.

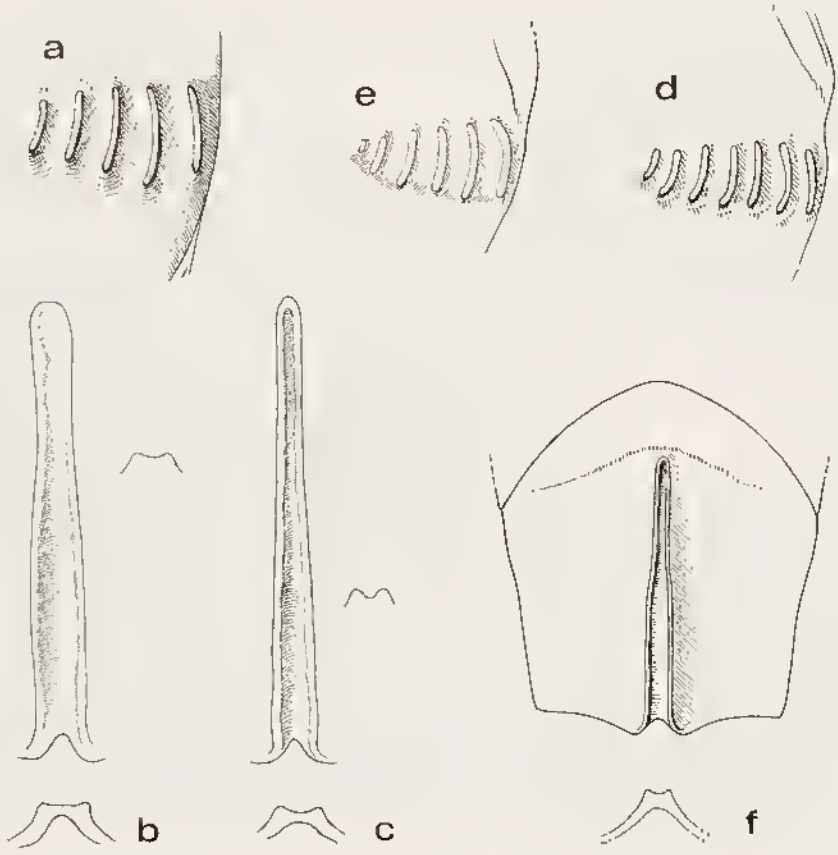

FIG. 8 a-d — *Metapenaeopsis stridulans* Alcock, 1905 : **a-b**, ♀ 18,0 mm, Nouvelle-Calédonie, baie de Saint Vincent (MNHN-Na 12799) : **a**, crêtes stridulantes; **b**, carène dorsale du troisième segment abdominal. — **c**, ♀ 16,7 mm, Thaïlande (MNHN-Na 12804), carène dorsale du troisième segment abdominal. — **d**, ♀ 14,5 mm, golfe Persique (îles Bahrein) (WAM), crêtes stridulantes.

FIG. 8 e-f. — *Metapenaeopsis tchekunovae* Starobogatov, 1972, ♀ paratype, mer d'Arabie (delta de l'Indus) (ZIL) : **e**, crêtes stridulantes; **f**, troisième segment abdominal vu de dessus et coupe transversale de la carène.

Source : MNHN, Paris

Reste le problème posé par *M. tchekunovae* Starobogatov, 1972. Cette espèce a été décrite d'après des spécimens récoltés au Pakistan, au large du delta de l'Indus. Elle se caractérise d'après STAROBOGATOV (1972 : 413, pl. 9, fig. 107) par :

— l'appareil stridulant composé de 7 crêtes.

— le rostre qui s'élend légèrement au delà du troisième article du pédoncule antennulaire.

— la carène dorsale du troisième segment abdominal avec un sillon bien marqué.

— le rapport de la longueur du sixième segment abdominal à sa hauteur, à son extrémité postérieure, égale à 2,2.

— un pétasma dans lequel le lobe distodorsal interne gauche est deux fois plus long que le lobe distodorsal externe gauche et un peu plus court que le lobe distoventral (ceci, si nous avons bien interprété le texte de STAROBOGATOV).

STAROBOGATOV mentionne également de petites différences dans le thélycum, mais nous n'avons pu les comprendre.

La présence d'un appareil stridulant à 7 crêtes et la localisation géographique des spécimens ayant été utilisés pour la description de *M. tchekunovae* nous a conduit à penser que cette espèce pouvait correspondre aux spécimens provenant des îles Bahrein. Ceci ne semble pas, toutefois, devoir être le cas, le pétasma, en particulier, ne présentant pas les caractères mentionnés par STAROBOGATOV. Nous avons essayé, dans ces conditions, d'obtenir en prêt les types de *M. tchekunovae*. Malheureusement seule une femelle paratype nous a été adressée. Son appareil stridulant ne possède que 6 crêtes (fig. 8 e), la carène dorsale de son troisième segment abdominal est creusée d'un sillon (fig. 8 f) et nous n'avons pas observé de différences entre son thélycum et ceux des spécimens de la même région que nous rattachons à *M. stridulans*. Dans ces conditions il faut admettre, soit que *M. thekunovae* est synonyme de *M. stridulans*, soit que l'holotype mâle appartient à un espèce différente de celle de la femelle paratype que nous avons pu examiner. L'examen de l'holotype de *M. tchekunovae* est donc nécessaire pour que la position de l'espèce de STAROBOGATOV puisse être clairement établie.

DISTRIBUTION. — Golfe Persique, mer d'Arabie, golfe du Bengale, Sri-Lanka, Thaïlande, Viet-Nam, S.W de la mer de Chine, Malaisie (y compris le Sabah), Singapour, Indonésie, Nouvelle-Guinée, Nouvelle-Bretagne, Nouvelle-Calédonie. De 9 à plus de 90 m de profondeur.

Metapenaeopsis fusca R. J. G. Manning, 1988

Fig. 9-t t

Metapenaeopsis fusca R. J. G. Manning, 1988 : 91, fig. 1 A-D. — DALL & ROTHLISBERG, 1990 : 74 (clé). — DALL, 1990 : 142, 147, 148.

Penaeus velutinus - BATE, 1888 : 253 (en partie, 1 ♂, st. 186). Non Dana, 1852.

MATÉRIEL EXAMINÉ. — **Australie**. *Côte sud-ouest* : Rockingham (Mangles Bay, Cockburn), sur des bancs de posidonies, R. J. G. MANNING coll., 1987 : 2 ♂ 9,8 et 11,0 mm; 3 ♀ 10,8 à 11,4 mm. — Rockingham, 32°16'S - 115°43'E, R. J. G. MANNING coll., 1989 : 1 ♂ 11,0 mm et 1 ♀ 10,2 mm (MNHN-Na 12810); 3 ♂ 8,0 à 12,0 mm; 2 ♀ 12,6 et 17,2 mm.

Côte nord : *"Challenger"* : st. 186, 10°30'S - 142°18'E, 15 m, 8.09.1874 : 1 ♂ 9,0 mm (BMNH).

Détroit de Torrès, île Thursday, port : 1 ♂ (abdomen seulement); 6 ♀ 8,9 à 12,5 mm (QM-W 15788).

Cette espèce se caractérise par :

— le rostre dont l'extrémité se situe entre la base et les trois quarts du troisième article du pédoncule antennulaire, pratiquement droit, très légèrement dressé, avec une pointe se recourbant très légèrement vers le bas, et portant de 6 à 8 dents, le plus souvent 7, sans compter l'épigastrique.

— l'épine ptérygostomienne petite, courte et fine.

— l'appareil stridulant qui est discret étant formé de crêtes très courtes et assez peu visibles, au nombre de 16 à 28, disposées sur un arc peu marqué (fig. 9 b).

Source : MNHN, Paris

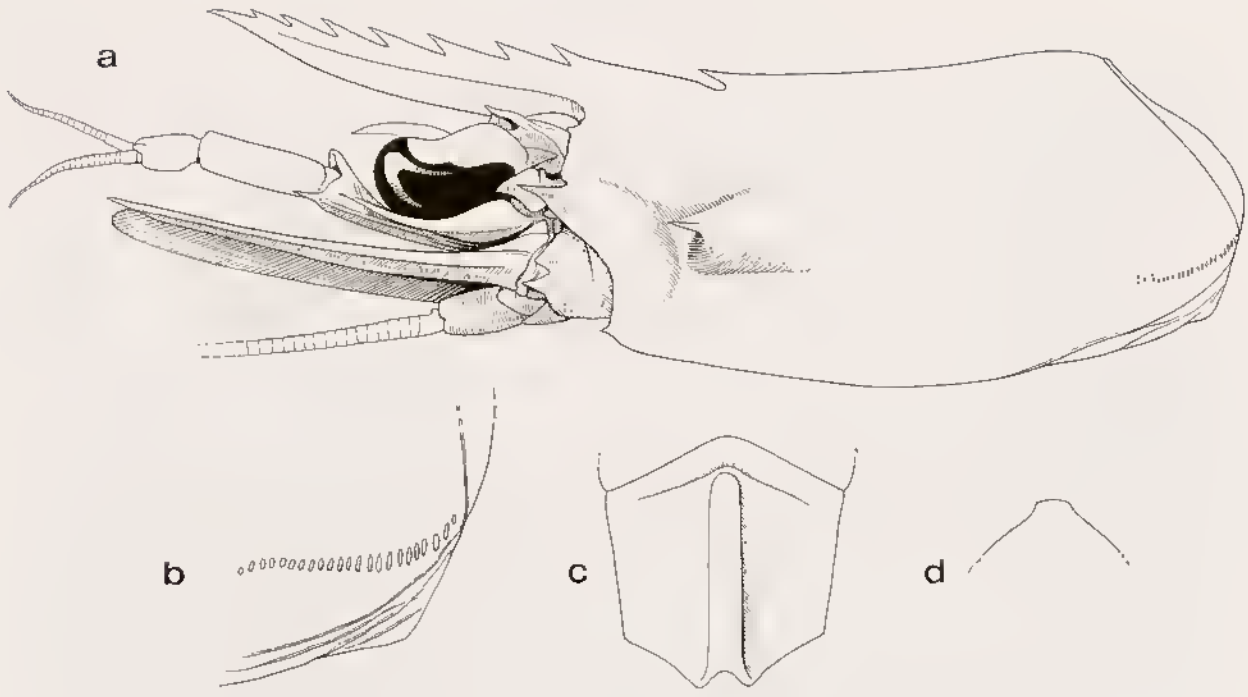

FIG. 9. — *Metapenaeopsis fusca* R. J. G. Manning, 1988 : ♀ 10,2 mm, Australie, Rockingham (MNHN-Na 12810) : a, partie antérieure du corps; b, appareil stridulant; c-d, troisième segment abdominal, vue dorsale et coupe transversale.

— la carène dorsale du troisième segment abdominal très remarquable par sa grande largeur. Elle est par ailleurs bien en relief, arquée en vue latérale, lisse, et très légèrement convexe transversalement (fig. 9 c-d).

— le thélycum (fig. 10) dont la plaque thélycale présente un rapport l/L compris entre 1,35 et 1,60; son bord antérieur ne présente pas de denticule médian marqué et a ses moitiés droite et gauche très légèrement concaves; ses bords antérolatéraux sont régulièrement arrondis et ses bords latéraux faiblement convergents vers l'arrière. Les expansions coxales des quatrièmes péréiopodes laissent la plaque intermédiaire bien dégagée; cette dernière est concave transversalement dans sa partie médiane et présente une paire de renflements latéraux, divergeant vers l'arrière et couverts de soies. Les réceptacles séminaux s'ouvrent le long du bord externe de ces renflements et sont partiellement cachés par les expansions coxales des quatrièmes péréiopodes. La plaque transversale est épaisse, à surface plutôt aplatie; elle dessine un arc dont la concavité centrale et les courbures des parties distales sont très marquées. La plaque postérieure a un lobe médian atteignant le niveau des latéraux. Une paire de longues épines se trouve sur le sternum, entre les deuxièmes péréiopodes, et une paire de tubercules accolés, entre les troisièmes.

— le pétasma (fig. 11 a-b) qui présente une valve gauche plus longue que la droite, et dont la partie distale, en vue ventrale, apparaît assez carrée, précédée d'un léger étranglement. La partie distale de cette valve porte des expansions simples plus ou moins triangulaires, de tailles un peu différentes, disposées sur une rangée transversale. Cette valve coiffe entièrement l'élément spiralé. La valve droite se termine en une pointe très mousse qui porte, du côté dorsal, de 1 à 6, le plus souvent 4, très petites expansions triangulaires. Cette valve coiffe partiellement l'élément distoventral. L'élément distodorsal gauche interne est atrophié et réduit à une minuscule languette. L'élément distodorsal gauche externe est, par contre, bien développé et son extrémité dépasse légèrement celle de l'élément spiralé; sa partie interne est recourbée ventralement et se termine par une forte expansion denticulée, aplatie dorsoventralement, à contour arrondi, qui vient buter contre l'élément spiralé; sa partie externe développe un fort épaulement spinulé à angle distodorsal droit (fig. 11 c-d). L'élément distoventral présente une expansion ventrolatérale dont le bord externe, spinulé, décrit une large courbe; cet élément présente, par ailleurs, une expansion distale spinulée bien développée, aplatie dorsoventralement, à contour arrondi, et qui s'insère entre l'élément spiralé et l'expansion distale de l'élément distodorsal gauche externe (fig. 11 e).

Source : MNHN, Paris

FIG. 10. — *Metapenaeopsis fusca* R. J. G. Manning, 1988, ♀ 10,2 mm. Australie, Rockingham (MNHN-Na 12810) : vue ventrale des sternites thoraciques V-VIII.

COLORATION. — R. J. G. MANNING (1988) indique que le corps, blanc translucide, est recouvert par des marbrures brun chocolat étendues, formant, en particulier, une large ligne latérale sur l'abdomen. Le bas des faces latérales de la carapace présente des mouchetures bleues.

Aucune photo en couleur de cette espèce n'a été publiée à ma connaissance, mais R. J. G. MANNING (1988, fig. 1 A) en a donné un bon dessin en noir et blanc.

TAILLE. — Le plus grand spécimen connu est l'holotype, qui a une carapace mesurant 19 mm et dont la longueur du corps, mesurée du fond de l'orbite à la pointe du telson, est de 74 mm.

REMARQUES. — Avant que R. J. G. MANNING montre que cette espèce était nouvelle, les spécimens qui lui étaient identifiables ont été mentionnés, dans les rapports locaux, sous l'appellation *M. novaeguineae* (R. J. G. MANNING, 1988).

Pour des raisons qui ne me sont pas claires, R. J. G. MANNING a estimé que cette espèce était particulièrement proche de *M. barbata* (de Haan, 1844). Cette idée a été reprise par DALL (1990 : 147). En fait *M. fusca* nous paraît se rattacher au groupe *M. palmensis*, *sinensis*, *aegyptia* beaucoup plus qu'à *M. barbata*.

DISTRIBUTION. — Cette espèce n'est encore connue avec certitude que de la côte sud-ouest de l'Australie, de Cockburn Sound à Singleton, entre 32°08'S et 32°27'S.

Les spécimens provenant, d'après l'étiquette qui y est jointe, de l'île Thursday (détroit de Torrès) posent un problème. Nous sommes enclin à penser que leur provenance est vraisemblablement inexacte et provient d'une erreur d'étiquetage. Ceci n'est pas l'avis du Dr P. DAVIE, conservateur des crustacés du Queensland Museum, qui nous a écrit : "I think that the locality is correct. The samples were collected by the Queensland Fisheries Torres

Source : MNHN, Paris

Strait Prawn Survey in 1974 along with *Metapenaeus endeavouri*, *Metapenaeopsis rosea* and *Penaeus esculentus*. *M. rosea*, at least, is only known from northern Australia so it seems very unlikely that the samples could have been mixed up. Secondly, I can't think of any way that we would have been given specimens from southwestern Australia. Our Queensland Fisheries Service only collects within Queensland waters".

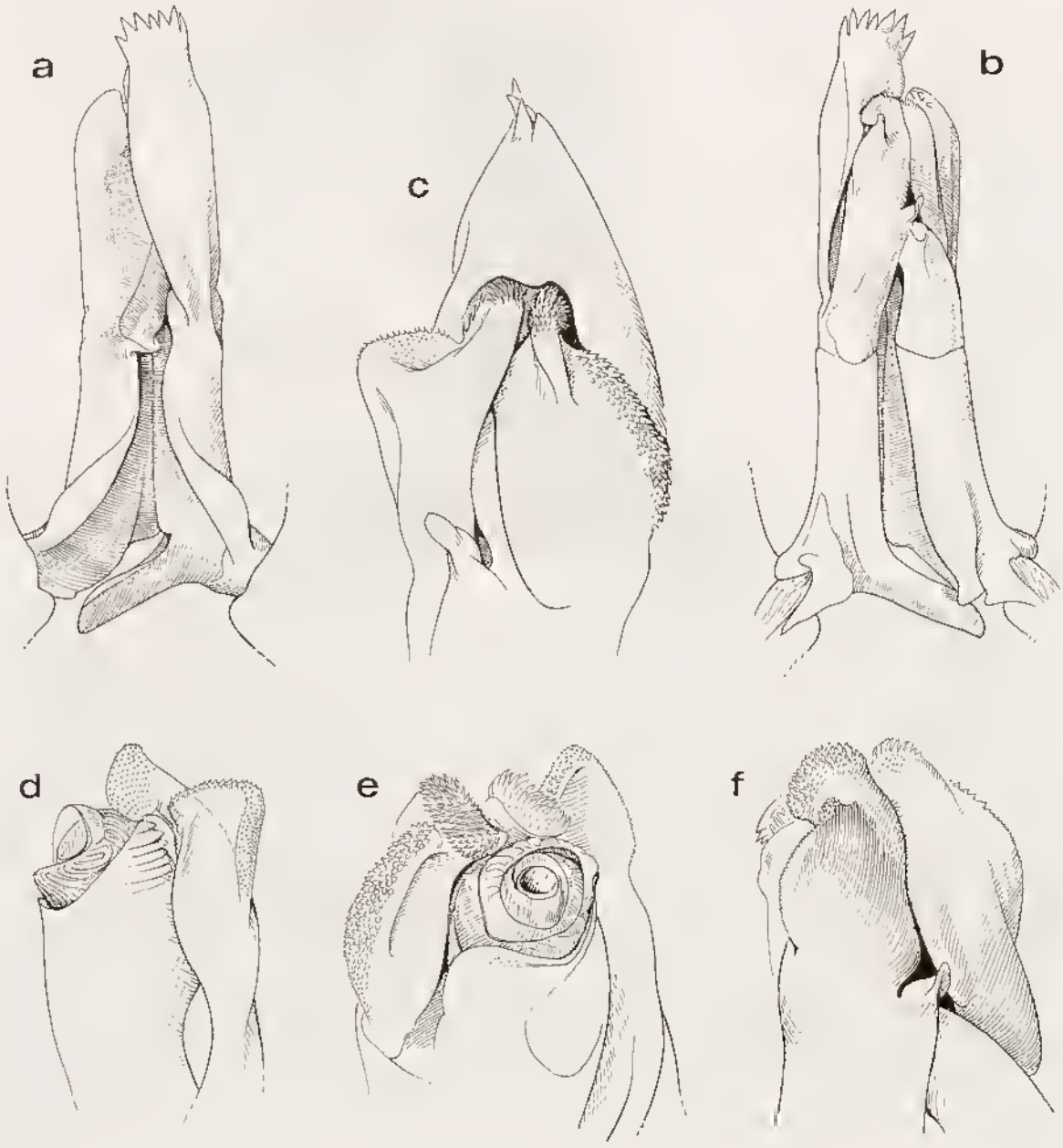

FIG. 11. — *Metapenaeopsis fusca* R. J. G. Manning, 1988, ♂ 11,0 mm, Australie, Rockingham (MNHN-Na 12810). Pétasma : **a**, vue ventrale; **b**, vue dorsale; **c**, partie distale, vue du côté droit, valve droite enlevée; **d**, partie distale, vue du côté gauche, valves enlevées; **e**, partie distale, vue antéroventrale, valves enlevées; **f**, partie distale, vue dorsale légèrement de biais, valves enlevées.

La position de P. DAVIE semble conforlée par le fait qu'un spécimen récollé par le *"Challenger"* à la station 186, près du Cape York, et identifié à *Penaeus velutinus* par BATE (1888 : 253), est une *M. fusca* et que par

Source : MNHN, Paris

ailleurs le "*Challenger*" n'a pas travaillé dans le sud-ouest de l'Australie. La répartition connue de cette espèce serait donc inattendue.

D'après R. J. G. MANNING (1988), *M. fusca* a été récoltée de 1 à 20 m de profondeur, sur des prairies de posidonies entrecoupées d'étendues de sable nu. L'espèce est considérée comme étant peu commune, voire rare, ceci s'expliquant vraisemblablement par son habitat situé hors des zones de pêche commerciale.

Metapenaeopsis novaeguineae (Haswell, 1879)

Fig. 12-14

Penaeus Novae-Guineae Haswell, 1879 : 43; 1882 : 203.
Penaeus velutinus - BATE, 1888 : 253 (en partie, st. 184, ♀ 9,0 mm). Non Dana, 1852.
Penaeus novae-guineae - ALCOCK, 1906 : 55 (liste).
Penaeopsis novae-guineae - SCHMITT, 1926 : 338 (en partie), pl. 61, fig. 2 b, pl. 68, fig. 2 b. Non pl. 61, fig. 1 et 2 a, pl. 68, fig. 2 a = *M. palmensis* (Haswell, 1879).
Penaeopsis (Metapenaeopsis) novae-guineae - RACEK, 1955 : 226 (en partie), pl. 4, fig. 4. Non pl. 7, fig. 1-2 = *M. palmensis* (Haswell, 1879); 1956 : 353 (en partie), 358 (clé). — ELDRED & HUTTON, 1960 : 93 (liste).
Penaeopsis (Metapenaeopsis) barbata - RACEK, 1959 : 10. Non de Haan, 1844.
Metapenaeopsis novae-guineae - DALL, 1957 : 167 (clé, en partie ?), 170 (en partie), fig. 11.
Metapenaeopsis novaeguineae - HOLTHUIS & ROSA, 1965 : 2 (en partie). — RAPSON & MCINTOSH, 1972 : 24 (clé), 62, 83, pl. 4, fig. n.n. — STAROBOGATOV, 1972 : 402, pl. 9, fig. 113 a-b. — BURUKOVSKY, 1974 : 37 (éd. 1983 : 48), fig. 43 a, 48. — WADLEY, 1978 : 9 (liste). — HOLTHUIS, 1980 : 17. — LOVETT, 1981 : 42, fig. 83. — GREY, DALL & BAKER, 1983 : 21 (liste), 22 (clé), 70, pl. 18, carte n.n. — DALL & ROTHLISBERG, 1990 : 74 (clé), 108, fig. 3.8. — DALL, 1990 : 143.
Non *Penaeopsis novae-guineae* - GEE, 1925 : 156 = *M. palmensis* (Haswell, 1879).
Non *Penaeopsis novae-guineae* - HALE, 1927, 39 (en partie), fig. 31 = *M. lindae* R. J. G. Manning, 1988.
Non *Penaeopsis (Metapenaeopsis) novae-guineae* - RACEK, 1959 : 10 = *M. palmensis* (Haswell, 1879).
Non *Metapenaeopsis novae-guineae* - CHEUNG, 1960 : 64 (clé). — HALL, 1962 : 105, pl. 21, fig. 22 et 24. — MOTOH, 1977 : 6 (liste) = *M. palmensis* (Haswell, 1879).
Non *Metapenaeopsis novaeguineae* - JOHNSON, 1979 : 5. — TORO & MOOSA, 1984 a : 16; 1984 b : 15. — NAAMIN, 1980 : 58, 60 = *M. palmensis* (Haswell, 1879).

MATÉRIEL EXAMINÉ. — **Australie**. "*Challenger* " : st. 184, 12°08'S - 145°10'E, 2560 m (sic), 29.08.1974 : 1 ♀ 9,0 mm (BMNH). Voir remarques infra.

"*Endeavour*" : Great Sandy Strait (Queensland) : 1 ♀ 17,1 mm (Ex AMS-P 3568, maintenant USNM 56244, identifié *Penaeopsis novae-guineae* par SCHMITT, 1926 : 338).

Shoal Bay (Northern Territory) : 2 ♂ 12,4 et 13,5 mm; 2 ♀ 18,6 et 20,0 mm (USNM 255628).

Marché de Freemantle. Origine inconnue, vraisemblablement Exmouth Gulf, A. CROSNIER leg., mars 1989 : 1 ♂ 11,3 mm; 1 ♀ 22,3 mm (MNHN-Na 12809); 6 ♀ 18,9 à 26,9 mm. — "*Portofino I*", shot 8A, 13°51'S - 128°17'E, 57 m, J. BUCKWORTH coll., 9.06.1989 : 2 ♂ 14,6 et 14,9 mm (MNHN-Na 12800).

Indonésie. Irian Jaya, île Frederik Hendrik, D. C. ZWOLLA coll., 10.02.1955 : 2 ♂ 16,9 et 18,7 mm (RMNH 21444).

Cette espèce se caractérise par :

— le rostre long (il dépasse nettement le pédoncule antennulaire), plutôt grêle, très nettement recourbé vers le haut dans sa moitié distale et qui ne porte que 5 dents, très rarement 6, sans compter l'épigastrique. Ces dents sont largement espacées les unes des autres à partir de la quatrième.

— l'épine ptérygostomienne fine et assez longue.

— l'appareil stridulant qui comporte de 13 (11 d'après RACEK & DALL, 1965) à 17 crêtes qui sont courtes (les antérieures peuvent, à la limite, être subcirculaires), jamais très espacées, et disposées sur un arc de cercle peu marqué, situé à un niveau très bas sur la carapace (au sixième environ de sa hauteur) (fig. 12 b).

— la carène dorsale du troisième segment abdominal, étroite, lisse (ou avec de rares ponctuations) et plate (fig. 12 c-d).

— le thélycum (fig. 13) dont la plaque transversale est large (rapport l/L compris entre 2,0 et 2,2), à bord antérieur à peine sinueux et sans denticule, à bords antéro-latéraux régulièrement arrondis et à bords latéraux

Source : MNHN, Paris

subparallèles. Les expansions coxales des quatrièmes péréiopodes, très modérément développées, sont très écartées l'une par rapport à l'autre, laissant la majeure partie de la zone intermédiaire visible. Cette dernière ne présente pas de sillon longitudinal mais est nettement concave tout en étant légèrement renflée transversalement dans sa partie centrale, tandis que ses parties latérales sont beaucoup plus renflées longitudinalement; la partie visible de ces parties latérales porte quelques soies, tandis que la partie cachée par les expansions coxales des quatrièmes péréiopodes est déprimée. La plaque transversale est étroite en son milieu et s'élargit vers ses extrémités; en arrière, cette plaque est séparée de la plaque postérieure, dans sa partie centrale, par une assez profonde dépression. Les réceptacles séminaux s'ouvrent sur les côtés de la plaque intermédiaire; leurs ouvertures sont cachées par les expansions coxales des quatrièmes péréiopodes. Une paire de longues épines se trouve sur le sternum, entre les deuxièmes péréiopodes, et une paire de larges dents, bien séparées, aplaties et à apex mousse, entre les troisièmes.

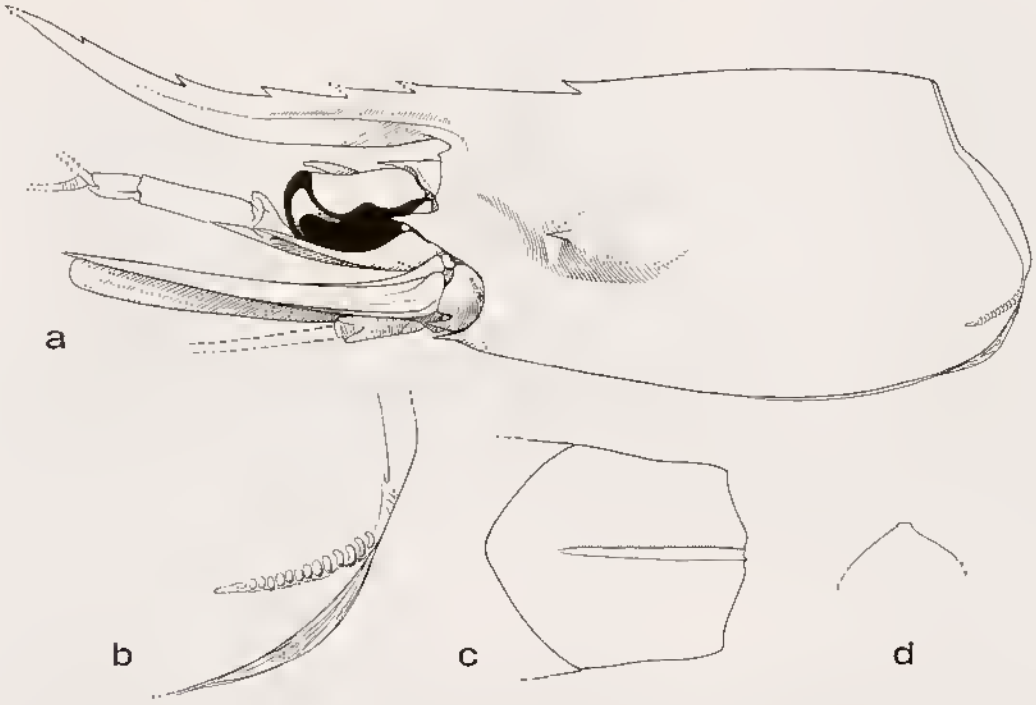

FIG. 12. — *Metapenaeopsis novaeguineae* (Haswell, 1879), ♀ 22,3 mm, Australie, marché de Freemantle (MNHN-Na 12809) : **a**, partie antérieure du corps; **b**, appareil stridulant; **c-d**, troisième segment abdominal, vue dorsale et coupe transversale.

— le pétasma (fig. 14 a-b) qui présente une valve gauche plus longue que la droite et se terminant par un bouquet d'expansions digitiformes charnues, parfois bi- ou même trifides. Cette valve coiffe en grande partie l'élément spiralé. La valve droite présente une partie distale arrondie, portant une rangée de digitations apicales de taille variable mais toujours petite. La valve droite recouvre la majeure partie de l'élément distoventral. L'élément distodorsal gauche interne est en forme de languette très allongée, assez étroite et à extrémité arrondie; il atteint presque l'extrémité de l'élément distodorsal gauche externe et dépasse l'élément spiralé et l'élément distoventral (fig. 14 c, e). L'élément distodorsal gauche externe, à peine plus long que l'interne, a une forme assez mouvementée : en vue dorsale, il apparaît avec sa partie externe en forme de gros bourrelet spinulé sur sa moitié distale et sa partie interne déprimée pour recevoir l'élément distodorsal gauche interne, tandis que sa partie distale est arrondie; sa face ventrale est creusée en cuillère (fig. 14 d-f). L'élément distoventral a la forme d'une massue un peu comprimée; il présente, vers le milieu de son bord dorsal, une forte protubérance triangulaire à sommet arrondi (fig. 14 d-e).

COLORATION. — GREY, DALL et BAKER (1983, pl. 18) ont publié une excellente photo en couleur de cette espèce. Sur un fond brun très clair, se détachent des marbrures brunes assez peu nombreuses. Une grande tache plus ou moins rectangulaire s'observe sur la moitié inférieure de la carapace, en arrière de son milieu.

Source : MNHN, Paris

FIG. 13. — *Metapenaeopsis novaeguineae* (Haswell, 1879), ♀ 22,3 mm, Australie, marché de Freemantle (MNHN-Na 12809) : vue ventrale des sternites thoraciques V-VIII.

TAILLE. — Parmi notre matériel, une femelle dont la carapace mesure 26,9 mm a une longueur totale d'environ 115 mm, ce qui semble la taille maximale connue.

DISTRIBUTION. — Elle semble limitée à la moitié nord de l'Australie (du golfe d'Exmouth à l'ouest jusqu'à la baie de Moreton à l'est), à la partie sud de l'Irian Jaya et à la Papouasie, entre 5 et 30 m de profondeur, sur les fonds de vase ou de vase sableuse.

REMARQUES. — Cette espèce fait partie de celles qui ont eu une existence taxonomique agitée. Décrite en 1879, elle a été oubliée puis retrouvée par SCHMITT (1926) qui a, alors, mis en synonymie avec elle *M. palmensis* (Haswell, 1879) et *M. stridulans* (Alcock, 1905), conduisant ainsi, par la suite, divers auteurs à des identifications erronées. Il a fallu attendre le travail de RACEK & DALL (1965) pour que les identités de *M. novaeguineae* et *M. palmensis* soient enfin éclaircies.

Ce qui précède explique que plusieurs auteurs aient mentionné *M. novaeguineae* de la région de Hong-Kong (GEE, 1925; MOTOH, 1977), ou de la Malaisie (JOHNSON, 1976), ou de l'ouest de Indonésie (TORO & MOOSA, 1984 a, 1984 b; NAAMIN, 1980). Tous ces auteurs ont confondu *M. palmensis* avec *M. novaeguineae*.

CHEUNG (1960) mentionne *M. novaeguineae* dans une clé comprenant les espèces se trouvant à Hong-Kong; cet auteur répète les indications données par DALL (1957 : 167) dans sa clé, indications regroupant les caractères de *M. novaeguineae* et *M. palmensis*. Seule *M. palmensis* se trouvant à Hong-Kong, il faut admettre que la référence de CHEUNG se rapporte à cette dernière espèce.

Source : MNHN, Paris

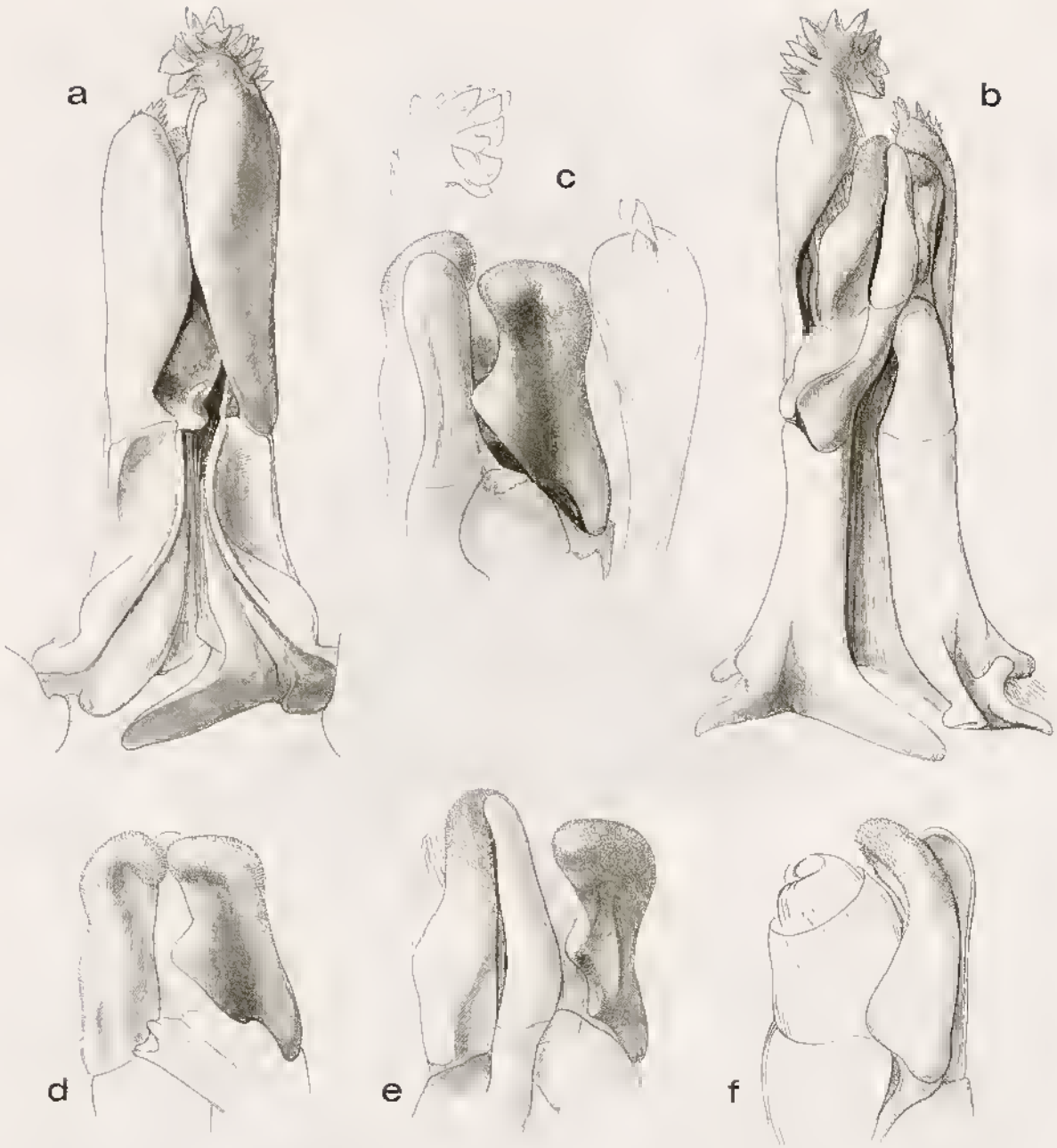

FIG. 14. — *Metapenaeopsis novaeguineae* (Haswell, 1879). Pèlasma : **a-b** : ♂ 14,9 mm, Australie, 13°51'S - 128°17'E (MNHN-Na 12800) : **a**, vue ventrale; **b**, vue dorsale. — **c-g** : ♂ 14,6 mm, *ibidem* (MNHN-Na 12800) : **c**, vue latérale droite, valves écartées; **d**, vue latérale droite avec l'élément distodorsal gauche interne rabattu et les valves enlevées; **e**, vue dorsolatérale droite, valves enlevées; **f**, vue latérale gauche, valves enlevées.

LOVETT (1981) a introduit *M. novaeguineae* dans sa clè relative aux Crustacés Dècapodes de Malaisie et de Singapour, mais sans mentionner de lieux de récolte contrairement aux autres espèces citées. Les caractères et les dessins qu'il donne (copiés de DALL, 1957) permettent de rattacher cette référence, en tant que clè, à *M. novaeguineae*.

Mentionnons, enfin, que parmi les spécimens identifiés à *M. velutina* Dana, 1852, par BATE (1888), se trouve une femelle dont la carapace mesure 9,0 mm, qui est supposée avoir été récoltée à la station 184 du *"Challenger"*,

Source : MNHN, Paris

dans l'est de la péninsule d'York, et qui est une *M. novaeguineae*. L'ennui est que la station 184 a été faite à 1400 fathoms (2560 m de profondeur), profondeur totalement incompatible avec la présence de *M. novaeguineae*. Il faut donc admettre qu'il y a eu une erreur d'étiquetage. Mentionnons aussi qu'à cette station, BATE mentionnait deux femelles. Dans le tube relatif à cette station se trouve bien un second spécimen, mais il n'appartient pas au genre *Metapenaeopsis* et, par ailleurs, il s'agit d'un mâle dont le pélasma manque. Ce spécimen a été identifié à *Metapenaeus anchistus* par BURKENROAD, lors de la visite qu'il a effectuée à Londres en 1938. Comme nous l'exposons dans les remarques consacrées à *M. barbata*, les récoltes du "*Challenger*" identifiées à *Penaeus velutinus* par BATE semblent avoir été fort maltraitées en ce qui concerne leur étiquetage.

Metapenaeopsis dura Kubo, 1949

Fig. 15-17

Penaeus velutinus - KISHINOUYE, 1900, pl. 7, fig. 11 (pétasma). Non Dana, 1852.

Metapenaeopsis durus Kubo, 1949 : 421, fig. 8 A, 18 G-L, 22 O, 46 D, 64 C-C', 76 E et J, 80 L, 148 C, 149. — CHEUNG, 1960 : 64.

Metapenaeopsis dura - MIYAKE, 1961 a : 7; 1982 : 172 (liste). — MIYAKE, SAKAI & NISHIKAWA, 1962 : 122 (liste). — RACEK & DALL, 1965 : 37, fig. 2 H, pl. 5, fig. 1, pl. 9, fig. 7. — STAROBOGATOV, 1972 : 402, pl. 9, fig. 111 a-b. — BURUKOVSKY, 1974 : 35 (éd. 1983 : 46), fig. 43 H. Non fig. 46 A-B = *M. crassissima* Racek & Dall, 1965. — LEE & YU, 1977 : 58, fig. 37 A-D. — FUJINO, 1978 : 20 (liste). — TORIYAMA & HAYASHI, 1952 : 87, 103 (listes), tabl. 2. — HAYASHI, 1982 : 188 (clé), 190, fig. 22 b, 23 c, 24 c, 25 c, 26 c; 1986 : 61, 241, fig. couleur 20; 1992 : 81 (clé), 87, fig. 42 c, 43 c, 44 c, 45 c, 46 c. — YU & CHAN, 1986 : 32, 41 (clé), 148, fig. n. n., carte. — LIU, ZHONG *et al.*, 1988 : 229, fig. 139. — DALL & ROTHLISBERG, 1990 : 73. — DALL, 1990 : 142.

? *Metapeneus barbatus* - MAKI & TSUCHIYA, 1923 : 35, pl. 3, fig. 3. Non de Haan, 1844, *fide* KUBO, 1949.

? *Metapenaeopsis durus* - NAAMIN, 1980 : 58, 60.

Non *Metapenaeopsis durus* - DALL, 1957 : 167 (clé), 168, fig. 10 A-B = *M. crassissima* Racek & Dall, 1965.

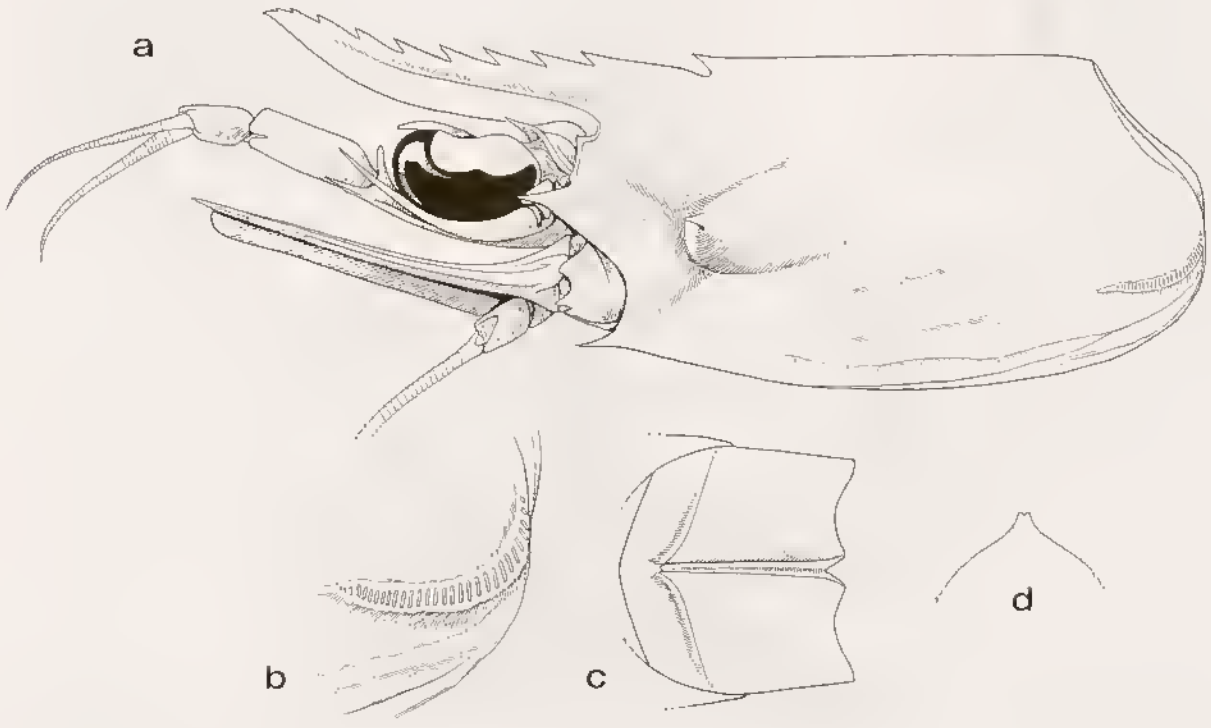

FIG. 15. — *Metapenaeopsis dura* Kubo, 1949, ♀ 22,5 mm, Taiwan (MNHN-Na 12808) : **a**, partie antérieure du corps; **b**, appareil stridulant; **c-d**, troisième segment abdominal, vue dorsale et coupe transversale.

Source : MNHN, Paris

MATÉRIEL EXAMINÉ — **Japon**. Kakefuchi (Yamaguchi Prefecture), Yamaguchi Gaikai regional Fisheries Research Station coll., 16.11.1976 : 1 ♂ 13,0 mm. — Egawa, Tanabe City, Kii Peninsula, 50 m, K. SAKAI coll., 3.10.1988 : 1 ♂ 20,2 mm. — Tosa Bay (Kochi Prefecture), M. TORIYAMA leg. : 1 ♀ 10,9 mm. — Kagoshima, T. URITA coll. : 1 ♂ 20,0 mm (USNM 49270).

Taiwan. Kaohsiung, D.-A. LEE leg. : 1 ♂ 23,9 mm (MNHN-Na 12807); 1 ♂ 24,0 mm (MNHN-Na 12830); 1 ♂ 23,8 mm, 1 ♀ 25,1 mm (MNHN-Na 9490). — Ta-Chi (I-Lan County), chalutage, T.-Y. CHAN leg. : 1 ♀ 22,5 mm (MNHN-Na 12808). — Ta-Chi (I-Lan County), T.-Y CHAN coll., 16.04.1988 : 1 ♂ 21,7 mm; 1 ♀ 22,2 mm (NTOU). — *Ibidem*,
T.-Y. CHAN coll., 8.06.1988 : 1 ♂, carapace cassée (MNHN).

Golfe de Siam. "*Pelamida*", chalutage à moins de 200 m, mars 1960 : 1 ♂ 21,1 mm.

Cette espèce se caractérise par :

— le rostre fortement recourbé vers le haut dans sa moitié distale et avec une pointe recourbée à son tour et dirigée vers l'avant. Ce rostre a son extrémité qui se situe entre la base et la moitié du troisième article du pédoncule antennulaire; il porte 8 ou 9 dents, sans compter l'épigastrique.

— l'épine ptérygostomienne bien développée, longue et fine.

— l'appareil stridulant qui comprend, chez l'adulte, de 28 à 35 crêtes (26 chez un spécimen dont la carapace mesure 13 mm). Ces crêtes sont proches les unes des autres, les postérieures étant à peine plus espacées que les antérieures (fig. 15 b).

— la carène dorsale du troisième segment abdominal, d'une largeur modérée et creusée d'un sillon très bien marqué sur toute sa longueur (fig. 15 c-d).

— le thélycum (fig. 16) dont la plaque thélycale, épaisse, est un peu plus large que longue (rapport l/L compris entre 1,20 et 1,25), à bord antérieur fortement convexe avec un denticule médian et à bords latéraux très faiblement

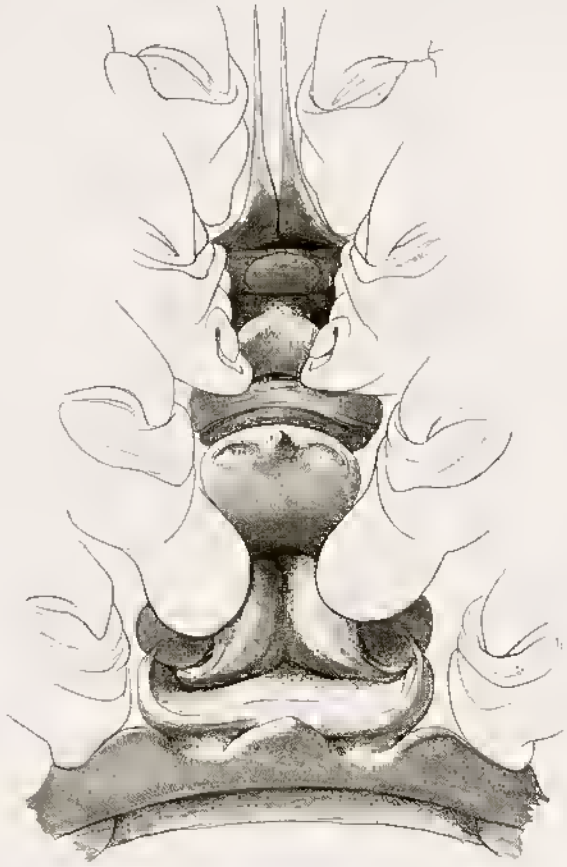

FIG. 16. — *Metapenaeopsis dura* Kubo, 1949, ♀ 22,5 mm, Taiwan (MNHN-Na 12808) : vue ventrale des sternites thoraciques V-VIII.

Source : MNHN, Paris

convergents vers l'arrière. Les expansions coxales des quatrièmes péréiopodes sont bien développées et recouvrent une grande partie de la plaque intermédiaire; celle dernière est creusée par un sillon médian longitudinal profond qui s'évase postérieurement et est bordée par deux fortes protubérances, en forme de virgules symétriques. Les réceptacles séminaux s'ouvrent le long du bord externe de ces virgules et sont partiellement cachées par les expansions coxales des quatrièmes péréiopodes. La plaque transversale forme un rebord très en relief en forme d'arc à extrémités fortement recourbées. Une paire de longues épines se trouve sur le sternum, entre les deuxièmes péréiopodes, et un très gros tubercule avec une dépression médiane, entre les troisièmes.

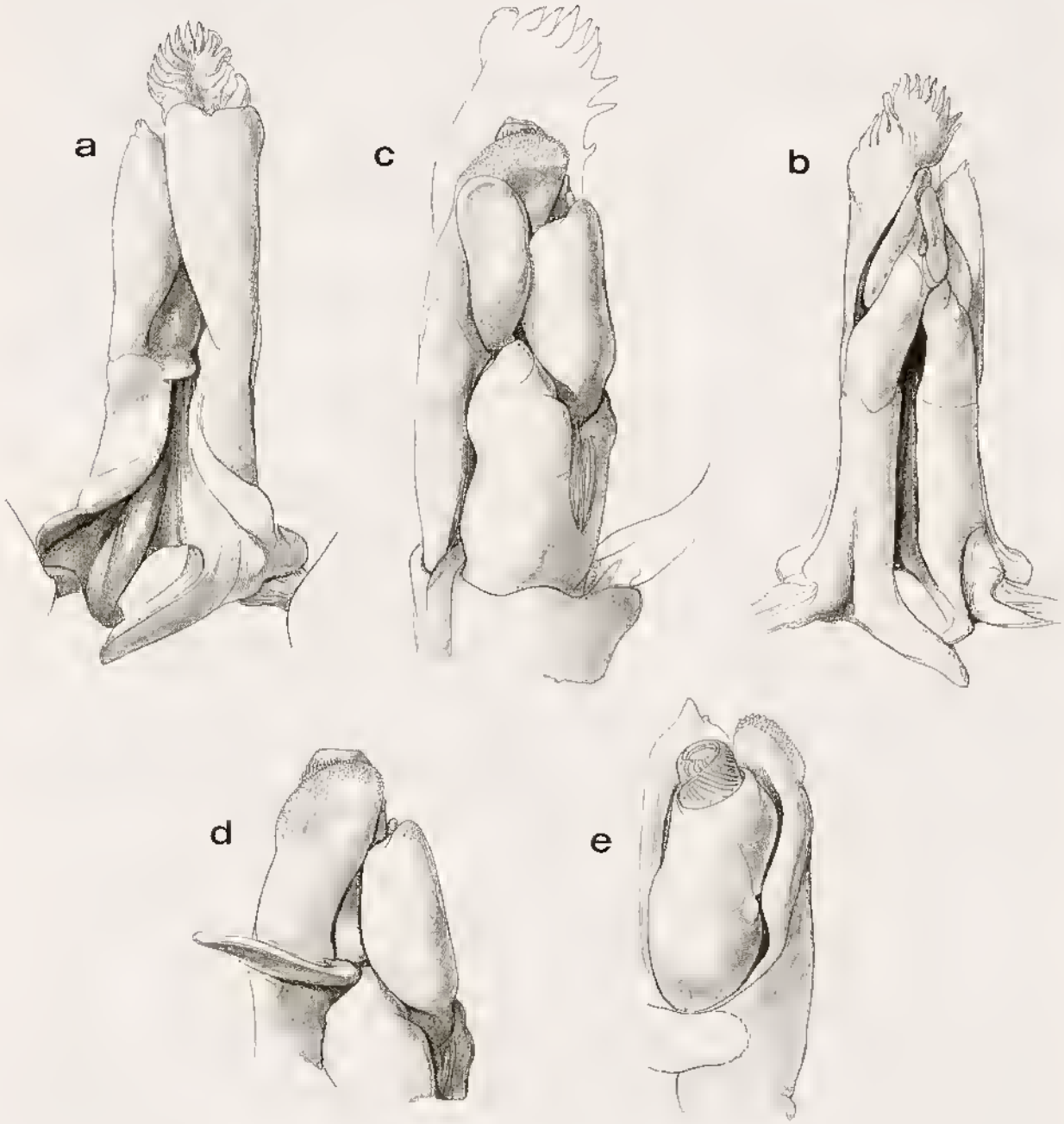

FIG. 17. — *Metapenaeopsis dura* Kubo, 1949. Pétasma : **a-d**, ♂ 23,9 mm, Taiwan (MNHN-Na 12807) : **a**, vue ventrale; **b**, vue dorsale; **c**, vue dorsolatérale droite, valve droite écartée; **d**, vue dorsolatérale droite avec l'élément distodorsal gauche interne rabattu et les valves enlevées. — **e**, ♂ 24,0 mm, Taiwan (MNHN-Na 12830) : vue latérale gauche, valve gauche rabattue.

Source : MNHN, Paris

— le pétasma (fig. 17 a-b) qui présente une valve gauche nettement plus longue que la droite, dont la partie distale est déprimée ventralement et fortement convexe dorsalement, ce qui lui donne un peu la forme d'un sabot de cheval; le pourtour de ce sabot est garni de fortes digitations serrées les unes contre les autres; cette valve coiffe l'élément spiralé. La valve droite s'étire légèrement en une pointe courte, bi- ou trifide; elle coiffe en grande partie l'élément distoventral. L'élément distodorsal gauche interne est en forme de languette allongée, très légèrement recourbée dorsalement et à bord distal régulièrement arrondi; il est nettement plus court que l'élément spiralé et l'élément distodorsal gauche externe, mais dépasse légèrement l'élément distoventral (fig. 17 c). L'élément distodorsal gauche externe est bien développé et son extrémité se situe à peu près au même niveau que celle de l'élément spiralé; il est sinueux en vue ventrale et apparaît légèrement recourbé ventralement en vue latérale; son bord distal est arrondi mais dissymétrique (fig. 17 d-e)). L'élément distoventral ne présente aucune forte expansion; son bord dorsal est presque droit, son bord ventral est convexe, sa partie distale présente une pointe mousse peu développée (fig. 17 d).

COLORATION. — HAYASHI (1986, fig. coul. 20) a publié une bonne photo en couleurs de cette espèce. Par ailleurs, le Dr T.-Y. CHAN nous a adressé la photo en couleurs d'une femelle capturée à Taiwan.

Cette crevette est assez régulièrement marbrée de brun-rouge sur un fond crème. La partie subdistale du rostre, la partie distale du deuxième article et la totalité du troisième article du pédoncule antennulaire, la partie distale du pédoncule antennaire et la partie basale des antennes, la partie distale du scaphocérite, la majeure partie de la rame interne des uropodes sont rouge orangé. Les antennules et la plus grande partie des antennes sont blanchâtres; il en est de même des péréiopodes qui présentent, toutefois, des taches rougeâtres par endroits.

TAILLE. — Parmi notre matériel, une femelle dont la carapace mesure 25,1 mm a une longueur totale de 120 mm. Il semble que ce soit la taille maximale atteinte par cette espèce.

DISTRIBUTION. — L'espèce a été signalée avec certitude du Japon et de Taiwan. CHEUNG (1960) l'a mentionnée à Hong-Kong. LIU, ZHONG *et al.* (1988), en mer de Chine Méridionale, à l'est de l'île Hainan.

NAAMIN (1980) l'a signalée en Indonésie (Sumatra et Java), mais je pense que la présence de *M. dura* dans ces îles ne pourra être acquise que lorsque le matériel de NAAMIN aura pu être réexaminé ou l'espèce retrouvée.

Nous avons par ailleurs identifié un mâle de cette espèce, se trouvant dans des récoltes russes étiquetées "Golfe de Siam". L'espèce n'ayant encore jamais été récoltée dans cette zone malgré les nombreuses études qui y ont été faites, nous nous demandons s'il n'y a pas eu une erreur d'étiquetage ou un mélange d'échantillons. Il ne nous paraîtrait pas raisonnable de considérer la présence de cette espèce dans le golfe de Siam comme prouvée d'après cette seule récolte.

Il existe fort peu de données sur la répartition bathymétrique : TORIYAMA et HAYASHI (1982) indiquent que cette espèce se trouve dans l'"Upper Littoral", c'est à dire la zone s'étendant entre 0 et 40 m de profondeur. Seul, l'un de nos échantillons nous a été envoyé avec une profondeur de récolte : 50 m. Enfin LIU, ZHONG *et al.* (1988) donnent deux profondeurs de récoltes : 46 et 180 m.

Metapenaeopsis lindae R. J. G. Manning, 1988

Fig. 18-19

Metapenaeopsis lindae R. J. G. Manning, 1988 : 97, fig. 2 A-D.
Penaeopsis novae-guineae - HALE, 1927, 39 (en partie), fig. 31. Non Haswell, 1879.

MATÉRIEL EXAMINÉ. — **Australie.** *Côte sud-ouest* : Singleton, 32°27'S - 115°44'E, R.J . G. MANNING coll., 1989 : 1 ♂ 10,0 mm; 1 ♀ 15,0 mm (MNHN-Na 12795); 2 ♂ 9,0 et 9,8 mm; 4 ♀ 9,2 à 13,7 mm (MNHN). — Rockingham (Mangles Bay, Cockburn), 32°16'S - 115°21'E, sur des bancs de posidonies, de nuit, 1 m, R. J. G. MANNING coll., 1987 : 2 ♂ 9,5 et 10,2 mm; 2 ♀ 10,5 et 16,5 mm (MNHN).

Côte sud : Coffin Bay, décembre 1957 : 1 ♀ 14,5 mm (AMS-P 14217), identifiée à *M. crassissima* par RACEK & DALL, 1965. — Great Australian Bight, 32°24'S - 133°24'E, chalutage, 40 m, P. SYMOND coll., 26.10.1973 : 1 ♀ 16,0 mm (VM-J 16328). — Port Lincoln (Boston Harbour), 15 m, B. J. SMITH coll., 4.11.1969 : 1 ♀ 12,9 mm (VM-

Source : MNHN, Paris

J 16330). — Port Lincoln (Spalding Cove), 4 m, 31.08.1976 : 1 ♂ 11,4 mm (VM-J 16332). — *"Rovoli Queen"*, golfe St Vincent , à 12,3 miles au SSE de Troubridge Point, chalutage, 34-36 m, W. ZEIDLER coll., 5.06.1987 : 2 ♂ 12,8 et 12,8 mm; 5 ♀ 16,0 à 17,0 mm (MNHN).

Cette espèce se caractérise par :

— le rostre pratiquement droit (il se redresse dans sa partie distale et sa pointe s'incurve vers le bas mais tout ceci de manière presque imperceptible), dont l'extrémité se situe entre la base et l'extrémité (ou même un peu au delà) du troisième article du pédoncule antennulaire et qui porte de 7 à 9 dents, le plus souvent 8, sans compter l'épigastrique.

— l'épine ptérygostomienne forte et longue.

— l'appareil stridulant qui comprend de 16 à 23 crêtes d'après nos observations, sans nombre bien préférentiel (de 17 à 26 d'après R. J. G. MANNING avec, le plus souvent, 22 ou 23)[1]. Ces stries ne sont pas très longues et régulièrement espacées les unes des autres (fig. 18 b).

— la carène dorsale du troisième segment abdominal qui est bien en relief et est creusée d'un sillon profond et étroit qui présente la particularité de ne pas s'étendre, dans la plupart des cas, jusqu'à l'extrémité postérieure de la carène. On note également, sur le troisième segment, la présence d'une carène transversale basse et glabre, sur la moitié inférieure de chaque tergite, vers son milieu (fig. 18 c-d).

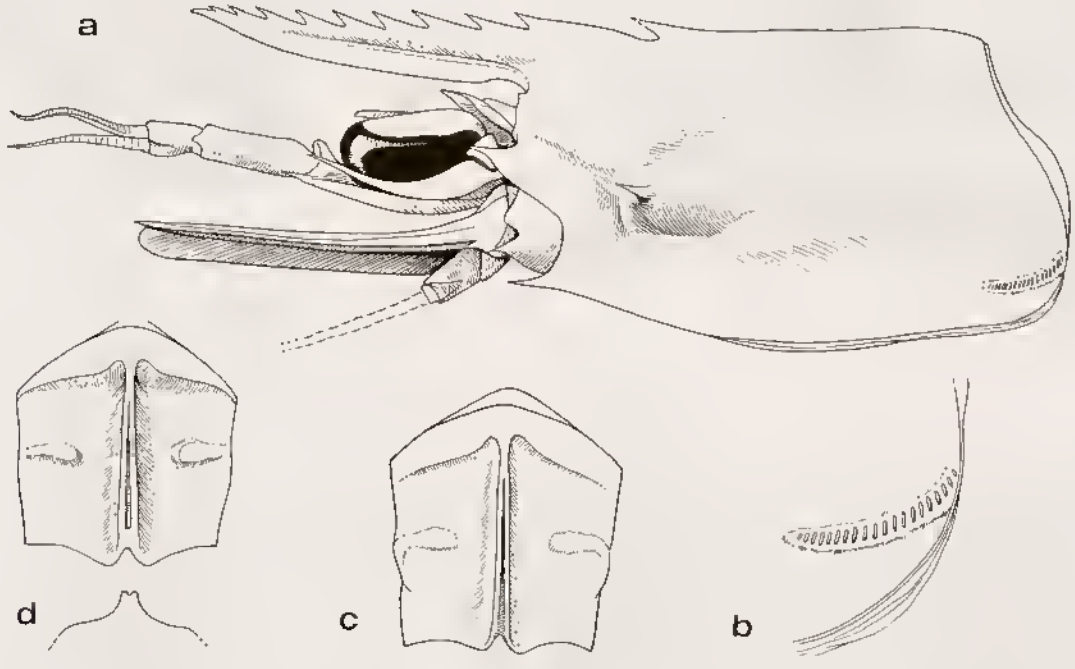

FIG. 18. — *Metapenaeopsis lindae* R. J. G. Manning, 1988 : a-c, ♀ 15,0 mm, Australie, Singleton (MNHN-Na 12795) : a, partie antérieure du corps; b, appareil stridulant; c, troisième segment abdominal, vue dorsale. — d, ♂ 10,0 mm, *ibidem* (MNHN-Na 12795) : troisième segment abdominal, vue dorsale et coupe transversale.

— le thélycum (fig. 19 a) dont la plaque thélycale est bien particulière, étant pratiquement aussi large que longue, avec une forme rappelant l'as de pique; suivant les spécimens, la partie antérieure de cette plaque peut avoir ses bords plus ou moins convexes. Elle est ornée de soies sur une grande partie de sa surface, avec deux petites zones d'implantations plus denses de chaque côté et en arrière de la pointe terminale. Les expansions coxales des

1. Un spécimen dont l'appareil stridulant ne comptait que 14 stries sur les branchiostèges gauche et droit a été observé, mais cela paraît être une exception.

Source : MNHN, Paris

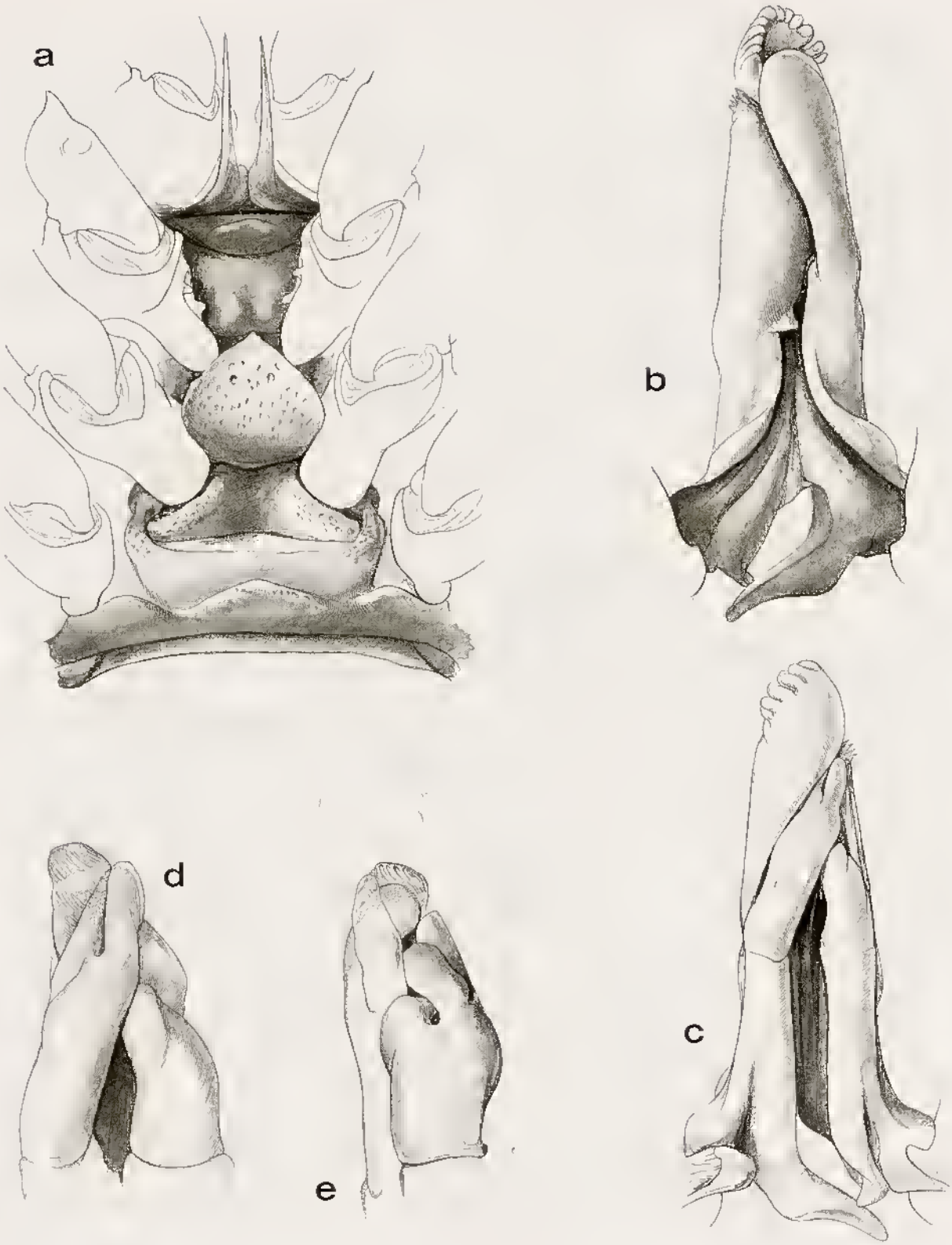

FIG. 19. — *Metapenaeopsis lindae* R. J. G. Manning, 1988 : a, ♀ 15,0 mm, Australie, Singleton (MNHN-Na 12795) : vue ventrale des sternites thoraciques V-VIII. — b-e, ♂ 10,0 mm, *ibidem* (MNHN-Na 12795). Pétasma : **b**, vue ventrale; **c**, vue dorsale; **d**, vue dorsale, valves enlevées; **e**, vue latérale droite, valves écartées.

Source : MNHN, Paris

quatrièmes péréiopodes sont modérément développées et laissent la zone intermédiaire bien visible. Cette dernière est concave et lisse dans sa partie médiane, ses parties latérales portent chacune un renflement oblique assez peu marqué et couvert de soies. La plaque transversale dessine un bourrelet large, en forme d'arc à extrémités régulièrement arrondies. Les réceptacles séminaux s'ouvrent sur les côtés de la plaque intermédiaire; leurs ouvertures sont presque entièrement cachées par les expansions coxales des quatrièmes péréiopodes. Une paire de longues épines se trouve sur le sternum, entre les deuxièmes péréiopodes; seule une paire de très légers renflements s'observe entre les troisièmes péréiopodes.

— le pétasma (fig. 19 b-c) qui présente une valve gauche plus longue que la droite, coiffant entièrement l'élément spiralé et se terminant en sabot de cheval à sole orientée ventralement. Cette sole est bordée par une douzaine environ (de 8 à 16 d'après R. J. G. MANNING) de digitations simples, disposées en une seule ligne, de taille diverse, recourbées vers la sole; la face ventrale de cette valve, hors le sabot, a son bord interne qui décrit une large courbe sinueuse et présente un maximum de largeur un peu au delà de la moitié de la longueur totale de la valve. La valve droite a sa face ventrale qui présente un maximum de largeur aux deux tiers de sa longueur; la partie la plus large de cette valve rentre sous la valve gauche lorsque le pétasma est fermé; cette valve se termine par des expansions digitiformes groupées, au nombre de 1 à 6, de taille variable mais toujours courtes. L'élément distodorsal gauche interne est en forme de languette allongée et dépasse légèrement l'élément distodorsal gauche externe, mais n'atteint pas tout à fait l'extrémité de l'élément spiralé (fig. 19 d). L'élément distodorsal gauche externe, aplati dorsoventralement, est fortement concave ventralement et recourbé du côté interne; son extrémité est arrondie (fig. 19 e). L'élément distoventral, en forme de club de golf, est court, mince et concave ventralement; son extrémité, arrondie, s'insère plus ou moins dans la courbure de l'élément distodorsal gauche externe, en passant sous l'élément distodorsal gauche interne (fig. 19 e).

COLORATION. — R. J. G. MANNING (1988) indique que le corps présente, sur un fond blanc translucide ou brun rose clair, des marbrures brun rouge plus ou moins foncé. La base des péréiopodes et des pléopodes sont d'un blanc crayeux, tandis que les uropodes sont brun rouge foncé.

Aucune photo en couleur de cette espèce n'a été publiée à ma connaissance, mais R. J. G. MANNING (1988, fig. 1 A) en a donné un bon dessin en noir et blanc.

TAILLE. — Le plus grand spécimen connu est l'holotype, une femelle dont la carapace mesure 19 mm, ce qui correspond à une longueur du corps (mesurée du fond de l'orbite à la pointe du telson) de 77 mm.

REMARQUES. — Comme nous le mentionnons à propos de *M. crassissima*, le spécimen de Coffin Bay (côte sud de l'Australie), identifié à *M. crassissima* par RACEK & DALL (1965), est une *M. lindae*. Ceci confirme, comme l'a fait remarquer très justement R. J. G. MANNING (1988), que la présence de *M. crassissima* Racek & Dall, 1965, sur la côte sud de l'Australie est peu vraisemblable.

Avant que R. J. G. MANNING ne montre que cette espèce était nouvelle, les spécimens qui lui étaient identifiables ont été mentionnés, dans les rapports locaux, sous l'appellation *M. novaeguineae* (R. J. G. MANNING, 1988). Dans les Muséums australiens, les spécimens de *M. lindae* que nous avons pu examiner étaient identifiés à *M. crassissima*.

Pour des raisons qui ne me sont pas claires, R. J. G. MANNING a estimé que cette espèce était particulièrement proche de *M. acclivis* (Rathbun, 1902). Cette idée a été reprise par DALL (1990 : 147). En fait *M. lindae* se rattache à *M. rosea* Racek & Dall, 1965, et *M. crassissima* Racek & Dall, 1965, beaucoup plus qu'à *M. acclivis*.

DISTRIBUTION. — Cette espèce n'est connue que des côtes sud-ouest et sud de l'Australie, du nord-ouest de Rottnest Island (31°59'S - 115°34'E) au golfe de Saint Vincent (138°E).

Metapenaeopsis acclivis (Rathbun, 1902)

Fig. 20-22

Penaeus velutinus - BATE, 1888 : 253 (en partie, 1 ♀, st. 186; 6 ♂ et 6 ♀, st. 233; 2 ♀, st. 234). Non Dana, 1852.
Parapenaeus acclivis Rathbun, 1902 : 41, fig. 12-14.

Source : MNHN, Paris

Metapeneus acclivis - ALCOCK, 1905 : 519 (liste); 1906 : 50 (liste).
Penaeus (Metapenaeus) acclivis - DE MAN, 1907 : 434, pl. 33, fig. 55.
Penaeopsis acclivis - DE MAN, 1911 : 8, 55. — YOSHIDA, 1941 : 13.
Penaeopsis stridulans - PESTA, 1915 : 104 en partie (spécimen "*Aurora*" 1896 de Yokohama). Non Alcock, 1905.
Penaeopsis barbatus - PARISI, 1919 : 61, pl. 5, fig. 3. — BALSS, 1924 : 44 (liste). Non de Haan, 1844.
Metapenaeus acclivis - URITA, 1921 : 215, 218.
Erithropenaeus acclivis - YOKOYA, 1930 : 8. — HORIKOSHI *et al.*, 1982 : 138.
Erythropenaeus acclivis - YOKOYA, 1933 : 8.
Penaeopsis akayebi - OSADA, TANIZAKI & NAKAZAWA, 1931 : 7, pl. 4, fig. en haut et à droite, *fide* KUBO, 1949. — YOSHIDA, 1941 : 13, *fide* KUBO, 1949. Non Rathbun, 1902.
Penaeopsis (Metapenaeopsis) acclivis - ELDRED & HUTTON, 1960 : 93 (liste).
Metapenaeopsis acclivis - KUBO, 1949 : 419, fig. 1 M, 8 C, 18 A-C, 22 N, 43 A-J, 46 C, 50 E-F, 64 B-B', 76 D et I, 80 K, 147 A-D, 148 b; 1960 : 110, pl. 55, fig. 1 (aquarelle). — YASUDA, 1956 : 379, 383-386, fig. 2 a. — DALL, 1957 : 167 (clé). — YASUDA, SHINOOKA & KOBAYASHI, 1957 : 28, 30, 31. — LIU, 1959 : 36 (liste). — MIYAKE, 1961 a : 7 (liste); 1961 b : 167 (liste); 1975 : 99 (photo couleur); 1982 : 13, pl. 5, fig. 4. — MIYAKE, SAKAI & NISHIKAWA, 1962 : 122 (liste). — IKEMATSU, 1963 : 17. — RACEK & DALL, 1965 : 36, fig. 2 I, pl. 4, fig. 11-12, pl. 9, fig. 8. — HOLTHUIS & ROSA, 1965 : 1. — STAROBOGATOV, 1972 : 402 (clé), pl. 9, fig. 112 a-b. — BURUKOVSKY, 1974 : 36 (clé) (édition 1983 : 47), fig. 43 i . — UTINOMI, 1976 (1ère édition 1956) : 58, pl. 28, fig. 5 (aquarelle). — LEE & YU, 1977 : 61, fig. 39 A-D. — SAKAMOTO & HAYASHI, 1977 : 1262 (liste). — FUJINO, 1978 : 19 (liste). — HOLTHUIS, 1980 : 13. — TAKEDA, 1982 : 6, aquarelle. — HAYASHI, 1982 : 188 (clé), 190, fig. 22 a, 23 a, 24 a, 25 a, 26 a; 1986 : 57, 239, fig. coul. 17; 1992 : 81 (clé), 83, fig. 42 a, 43 a, 44 a, 45 a, 46 a. — TORIYAMA & HAYASHI, 1982 : 87, 103 (listes), tabl. 2, 3, 4, fig. 5. — YU & CHAN, 1986 : 32, 41 (clé), 153, photo coul. n. n., carte — LIU, ZHONG *et al.*, 1988 : 216 (clé), 220, fig. 134. — DALL & ROTHLISBERG, 1990 : 74 (clé). — DALL, 1990 : 142, 147.
? Erythropenaeus akayebi - KISHINOUYE, 1929, fig. du pétasma et du thélycum page 281. Non Rathbun, 1902. Pétasma = *M. acclivis*; thélycum = *M. acclivis* ou *M. dura* Kubo, 1949.
Non *Parapenaeus acclivis* - PEARSON, 1905 : 72 = ? *M. toloensis* Hall, 1962. Voir remarques infra.
Non *Penaeopsis acclivis* - OSADA, TANIZAKI & NAKAZAWA, 1931 : 7, pl. 4, fig. en bas et à gauche = *M. barbata* (de Haan, 1844), *fide* KUBO, 1949.

MATÉRIEL EXAMINÉ. — **Japon.** *"Challenger"*: st. 233, 34°39'N - 135°14'E, 15 m, 17.05.1875 : 6 ♂ 11,6 à 14,5 mm; 6 ♀ 11,6 à 16,3 mm (BMNH); 1 ♂ 13,1 mm et 3 ♀ 11,2 à 14,8 mm (USNM). — St. 234, 32°31'N - 135°39'E, 4892 m (sic), 3.06.1875 : 2 ♀ 13,2 et 15,5 mm (BMNH). Tous ces spécimens identifiés *Penaeus velutinus* par BATE, 1888.

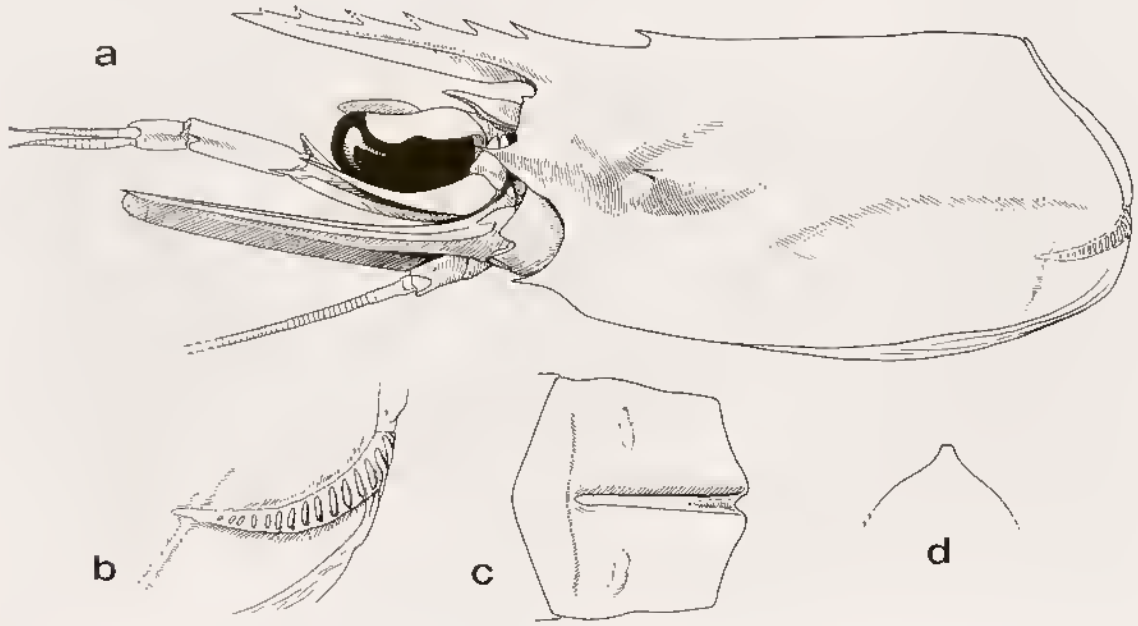

FIG. 20. — *Metapenaeopsis acclivis* (Rathbun, 1902), ♀ 20,3 mm, Japon, Egawa (MNHN-Na 12802) : a, partie antérieure du corps; b, appareil stridulant; c-d, troisième segment abdominal, vue dorsale et coupe transversale.

Source : MNHN, Paris

"Aurora" : Yokohama, 1896 : 1 ♂, identifié *Penaeopsis stridulans* par PESTA, 1915 (NMW).

Détroit de Uraga : 1 ♂ 15,5 mm, 1 ♀ 19,3 mm, identifiés *Penaeopsis barbatus* par PARISI, 1919 (MSNM 1674). — Egawa, Tanabe City, Kii Peninsula, 50 m, K. SAKAI leg., 3.10.1988 : 6 ♂ 10,5 à 15,5 mm; 18 ♀ 10,5 à 21,8 mm; 1 ♂ 16,3 mm et 1 ♀ 20,3 mm (MNHN-Na 12802). — Tanabe Bay, Wakayama, K. SAKAI leg., 26.10.1988 : 2 ♀ 11,4 et 18,8 mm. — Beppu Bay (Oita Prefecture), chalutage, M. TORIYAMA coll., 21.07.1976 : 1 ♂ 14,4 mm; 2 ♀ 16,3 et 16,4 mm (MNHN-Na 12811). — *Ibidem*, senne danoise, Oita Prefectural Fisheries Experiment Station coll., 21.07.1976 : 2 ♂ 11,3 et 11,4 mm; 1 ♀ 16,0 mm.

Taiwan. Takao, F. BAKER coll., 3.12.1914 : 1 ♀ 8,7 m. — *Côte nord-est* : Ta-Chi, chalutage, T.-Y. CHAN coll., 1.09.1989 : 1 ♀ 18,0 mm. *Côte sud* : Tong-Kong, T.-Y. CHAN coll., 20.10.1988 : 1 ♀ 14,4 mm (NTOU).

Australie. *"Challenger"* : st. 186, 10°30'S - 142°18'E, 15 m : 1 ♀ 14,0 mm (BMNH). Voir remarques infra.

Cette espèce se caractérise par :

— le rostre droit ou légèrement recourbé vers le haut, portant habituellement 6, rarement 7 dents chez les spécimens que nous avons examinés, ceci sans compter la dent épigastrique. Ce rostre a son extrémité qui se situe, à peu près, entre les trois cinquièmes du deuxième article du pédoncule antennulaire et la moitié du troisième.

— l'épine plérygostomienne bien développée, longue et fine.

— l'appareil stridulant qui comprend de 13 à 18 crêtes (le plus souvent 15) régulièrement espacées (fig. 20 b).

— la carène dorsale du troisième segment abdominal est peu large. Le plus souvent, ses trois cinquièmes antérieurs environ sont lisses et plats, ses deux cinquièmes postérieurs sont plus ou moins déprimés en gouttière. Chez quelques exemplaires, notamment ceux de Taiwan, on observe une apparence très faible de sillon sur toute la longueur, tandis que chez de grands exemplaires du Japon, la carène est entièrement plate (fig. 20 c-d).

— le thélycum (fig. 21) dont la plaque thélycale, épaisse, est plus longue que large (rapport l/L compris entre 0,85 et 0,95), à bord antérieur peu sinueux et à bords latéraux fortement convergents vers l'arrière. Les expansions coxales des quatrièmes péréiopodes sont très bien développées, avec un contour assez bien circulaire et ne laissent

FIG. 21. — *Metapenaeopsis acclivis* (Rathbun, 1902), ♀ 20,3 mm, Japon, Egawa (MNHN-Na 12802) : vue ventrale des sternites thoraciques V-VIII.

Source : MNHN, Paris

entre elles qu'un étroit intervalle; de ce fait, la zone intermédiaire est peu visible; elle est lisse avec un sillon longitudinal médian bordé par de très légers renflements divergents vers l'arrière. La plaque transversale forme un rebord bien en relief, à peine sinueux postérieurement, et marqué par des angles droits à ses extrémités. Les réceptacles séminaux s'ouvrent sur les côtés de la plaque intermédiaire; leurs ouvertures sont cachées par les

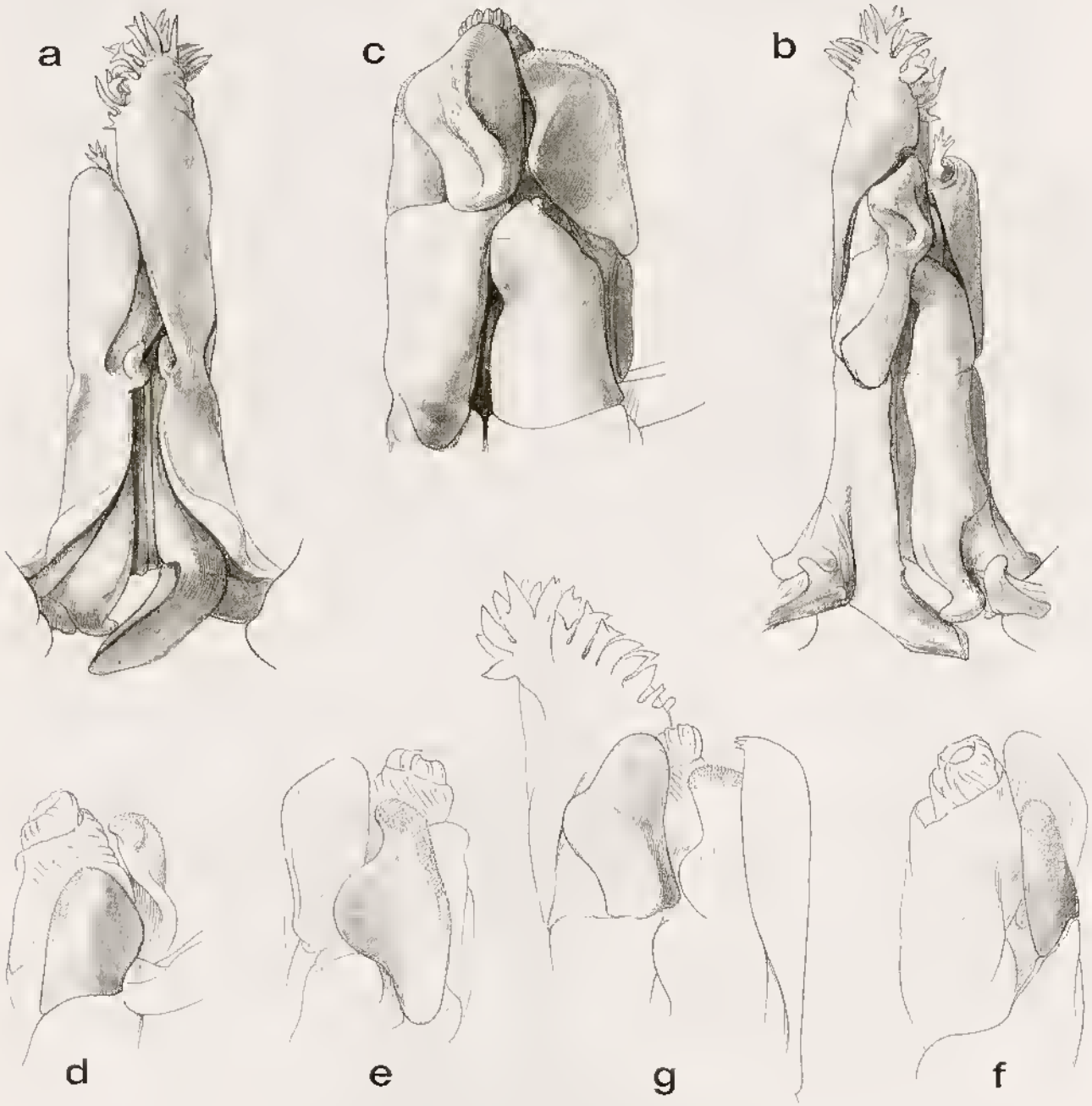

FIG. 22. — *Metapenaeopsis acclivis* (Rathbun, 1902). Pétasma : **a-f**, ♂ 16,3 mm, Japon, Egawa (MNHN-Na 12802) : **a**, vue ventrale; **b**, vue dorsale; **c**, vue dorsale de la partie distale, valves enlevées; **d**, vue dorsolatérale gauche avec l'élément distodorsal gauche interne rabattu et les valves enlevées (au lavis, élément distodorsal gauche externe); **e**, vue latérale droite, valves enlevées (au lavis, élément distoventral); **f**, vue latérale gauche, valves enlevées (au lavis, élément distodorsal gauche externe). — **g**, ♂ 14,4 mm, Japon, Beppu Bay (MNHN-Na 12811), partie distale (au lavis, élément distodorsal gauche interne).

Source : MNHN, Paris

expansions coxales des quatrièmes péréiopodes. Une paire de longues épines se trouve sur le sternum, entre les deuxièmes péréiopodes, et une paire de renflements arrondis, entre les troisièmes.

— le pétasma (fig. 22 a-b) qui présente une valve gauche nettement plus longue que la droite, peu étirée distalement et portant de nombreuses (de l'ordre de 12 à 15) digitations assez fortes et très souvent bifides; cette valve coiffe entièrement l'élément spiralé. La valve droite recouvre partiellement l'élément distoventral; son extrémité est arrondie en vue ventrale et porte, du côté dorsal, de 1 à 3 très petites digitations divisées ou non à leur extrémité. L'élément distodorsal gauche interne est de forme quadrangulaire; il dépasse l'élément spiralé et l'élément distoventral; ses bords latéraux sont sinueux, l'externe est plus court que l'interne; son bord antérieur est plus ou moins sinueux; son extrémité est arrondie. Cet élément se caractérise par la présence, sur sa face dorsale, d'une forte côte sinueuse (fig. 22 c). L'élément distodorsal gauche externe est nettement plus court que l'interne; en vue ventrale, il montre une partie distale arrondie; en vue externe, il ne présente pas d'expansion dorsale (fig. 22 d, f). L'élément distoventral n'est que modérément développé (sans expansion du côté externe); son bord externe se recourbe régulièrement dans sa partie distale qui se termine par un léger renflement qui vient buter contre l'élément spiralé; son bord dorsal interne présente une expansion arrondie, très développée (fig. 22 c, e).

COLORATION. — Les photos publiées (MIYAKE, 1975, 1982 et HAYASHI, 1986) montrent une crevette jaunâtre avec des marbrures rouges ou brunes qui semblent variables.

REMARQUES. — Nous avons pu réexaminer le mâle et la femelle identifiés à *M. barbatus* (de Haan, 1844) par PARISI (1919 : 61, pl. 5, fig. 3) et conservés au Muséum de Milan. Comme KUBO (1949) l'avait bien vu, ces spécimens sont des *M. acclivis*. BURKENROAD qui, lui aussi, a examiné ces spécimens a noté dans leur flacon : "*P.* n. sp. (= *acclivis* De Man, not RATHBUN)". Contrairement à BURKENROAD nous sommes convaincu de leur identité à *M. acclivis*. Nous avons essayé de retrouver la femelle examinée par DE MAN et décrite dans son travail de 1924, mais cela n'a pas été possible; elle ne se trouve ni à Amsterdam, ni à Leiden, ni à Londres.

KUBO (1949 : 421) indique que le pétasma représenté par KISHINOUYE (1929 : 281) comme étant celui de *M. akayebi* [= *M. barbata* (de Haan, 1844)] n'appartient pas à cette espèce mais à *M. acclivis*, compte tenu du développement des digitations de la partie distale de la valve droite. Cela nous paraît plausible. On peut par ailleurs se poser la question de l'appartenance du thélycum représenté par KISHINOUYE, à la même page, toujours sous le nom de *M. akayebi*. Compte tenu du développement des plaques coxales des quatrièmes péréiopodes, il ne semble pas qu'il puisse s'agir de *M. barbata* mais soit de *M. acclivis*, soit plutôt, compte tenu de la forme de la plaque thélycale, de *M. dura* Kubo, 1949.

Nous avons pu examiner, à Londres, ce qui reste des spécimens identifiés par BATE (1888 : 253) à *Penaeus velutinus*. Parmi ces spécimens se trouvent 3 femelles de *M. acclivis* (voir la rubrique Matériel examiné), le problème est que, manifestement, des mélanges d'étiquettes ont eu lieu. Une de ces femelles est sensée avoir été récoltée dans le sud du Japon, ce qui est parfaitement plausible, mais à une profondeur de 4892 m, ce qui est impossible. Les deux autres femelles auraient été récoltées dans le nord de l'Australie, ce qui semble bien peu vraisemblable puisque, malgré les très nombreuses récoltes faites dans cette région, l'espèce de RATHBUN n'y a jamais été trouvée et n'est actuellement pas connue avec certitude au sud de Taiwan.

PEARSON (1905 : 72) mentionne *M. acclivis* au Sri Lanka, ce qui est manifestement une erreur, compte tenu de la répartition connue de cette espèce. PEARSON ne donnant aucune description valable de son matériel, il faudrait pouvoir le réexaminer. Malheureusement, comme nous l'avons signalé (CROSNIER, 1991 : 236), les crevettes étudiées par PEARSON, en 1905, semblent avoir toutes disparues. PEARSON mentionnant que la formule rostrale de ses spécimens est 7 à 8 +1/0, on peut penser qu'ils peuvent appartenir à *M. toloensis* Hall, 1962, signalé du Sri-Lanka comme abondant par DE BRUIN (1965 : 85), mais il s'agit là d'une simple suggestion.

TAILLE. — Notre plus grand spécimen, une femelle, a une longueur totale de 98 mm (Lc = 21,8 mm). Dans la littérature, 100 mm est considérée comme étant la taille maximale.

DISTRIBUTION. — L'espèce n'est connue que du Japon méridional où elle est souvent abondante, et de la côte nord-est de Taiwan où elle est rare. Sa répartition bathymétrique semble aller de 9 à 50 m. D'après TORIYAMA et HAYASHI (1982), elle se trouverait entre 20 et 80 m à Tosa Bay.

Source : MNHN, Paris

Metapenaeopsis crassissima Racek & Dall, 1965

Fig. 23-24

Metapenaeopsis crassissima Racek & Dall, 1965 : 26 (en partie, non le spécimen de Coffin Bay), fig. 2 C, pl. 2, fig. 1, pl. 4, fig. 5-6, pl. 9, fig. 3. — Rapson & McIntosh, 1972 : 24 (clé), 62, 83. — Racek, 1973 : 155, 157 (liste), 159 (clé), 165. — Burukovsky, 1974 : 35 (clé), fig. 43 c (édition de 1983 : 45, fig. 43 C). — Motoh, 1977 : 6 (liste). — Holthuis, 1980 : 15. — Grey, Dall & Baker, 1983 : 21, 22, 74, fig. 12, pl. 20, carte page 75. — Dall & Rothlisberg, 1990 : 73. — Dall, 1990 : 142.
Metapenaeopsis crassisima - Starobogatov, 1972 : 402, pl. 9, fig.108.
Metapenaeopsis durus - Dall, 1957 : 168, fig. 10 A-B. Non Kubo, 1949.
? *Penaeopsis novae-guineae* - Hale, 1927 : 39, fig. 31. Non Haswell, 1879.

Matériel examiné. — **Australie.** *Côte ouest* : au nord-ouest de Cape Inscription, Shark Bay, dragage, sable, "*Davena*" coll., 15.05.1960 : 2 ♂ 22,1 et 24,2 mm; 1 ♀ 19,3 mm. — Shark Bay, J. C. Miquel coll., 16.05.1979 : 1 ♂ 20,8 mm; 2 ♀ 22,2 et 28,3 mm (USNM). — Marché de Freemantle près de Perth, provenance vraisemblable Shark Bay, A. Crosnier coll., mars 1989 : 3 ♂ 19,8 à 21,7 mm; 5 ♀ 21,5 à 28,6 mm.

Côte nord-ouest : 15 miles WSW de Camarvon, 22-26 m, L. Marsh et M. Sinclair coll., 2.07.1975 : 1 ♂ 22,5 mm; 1 ♀ 22,8 mm (MNHN 12801).

Cette espèce se caractérise par :

— le rostre recourbé vers le haut, dont l'extrémité se situe entre le quart et l'extrémité du troisième article du pédoncule antennulaire (ou même très légèrement au delà) et qui porte, sans compter l'épigastrique, 8, plus rarement 7 ou 9, dents dont les deux distales sont très proches l'une de l'autre. La pointe du rostre est légèrement recourbée vers le bas.

— l'épine ptérygostomienne très développée, longue et fine.

— l'appareil stridulant composé de 10 à 15 (17 d'après Racek & Dall, 1965) crêtes (le plus souvent 13 ou 14 chez les adultes). Ces crêtes, disposées suivant un arc de cercle bien marqué, sont courtes; les postérieures sont nettement plus espacées que les antérieures (fig. 23 b).

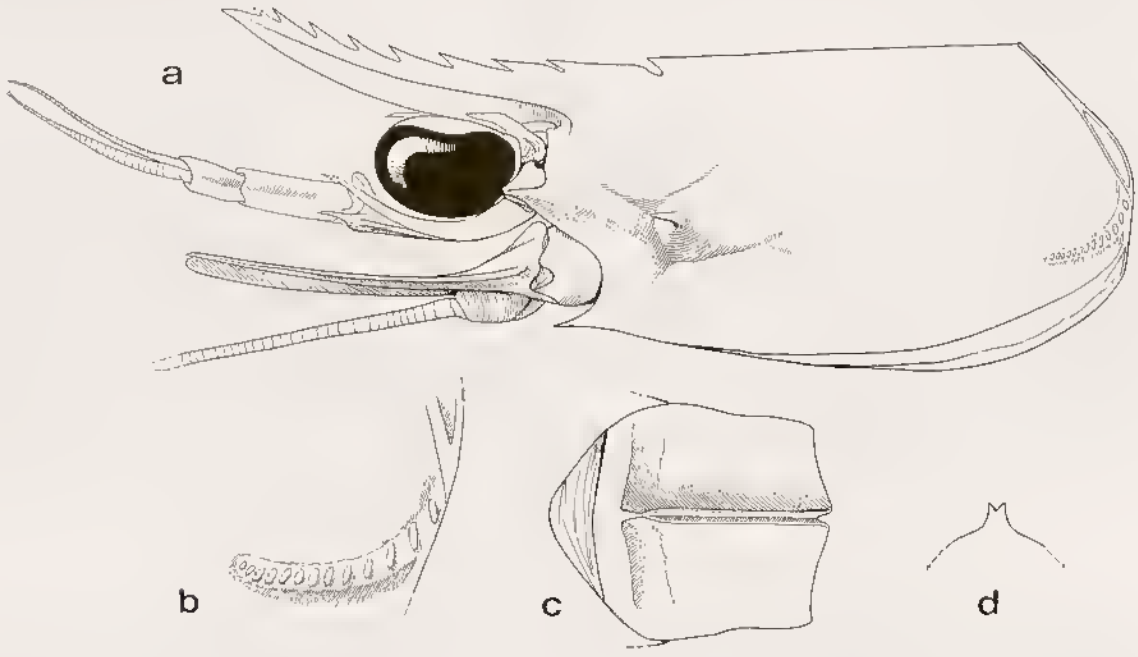

Fig. 23. — *Metapenaeopsis crassissima* Racek & Dall, 1965, ♀ 22,8 mm, Australie, côte nord-ouest (MNHN-Na 12801) : **a**, partie antérieure du corps; **b**, appareil stridulant; **c-d**, troisième segment abdominal, vue dorsale et coupe transversale.

Source : MNHN, Paris

— la carène dorsale du troisième segment abdominal, très saillante, relativement fine, et creusée d'un sillon fin et bien marqué sur toute sa longueur (fig. 23 c-d).

— le thélycum (fig. 24 a) dont la plaque thélycale est assez large (rapport l/L compris entre 1,5 et 1,6), fortement concave transversalement et convexe longitudinalement, avec un bord antérieur légèrement sinueux, des bords antérolatéraux très régulièrement arrondis et des bords latéraux concaves et nettement convergents vers l'arrière. Les expansions coxales des quatrièmes péréiopodes laissent la zone intermédiaire bien dégagée. Cette dernière présente deux forts renflements symétriques courbes, séparés par un profond sillon médian qui se divise en arrière et borde les parties postérieures des renflements. La plaque transversale forme un bourrelet dessinant un arc à extrémités régulièrement arrondies. Les réceptacles séminaux, dissimulés par les expansions coxales des quatrièmes péréiopodes, s'ouvrent dans la zone intermédiaire, le long du bord externe des renflements. Une paire de longues épines se trouve sur le sternum, entre les deuxièmes péréiopodes; entre les troisièmes, on observe une forte excroissance, divisée dans sa partie distale en deux tubercules par une échancrure arrondie.

— le pétasma (fig. 24 b-e) qui présente une valve gauche plus longue que la droite, coiffant entièrement l'élément spiralé ainsi qu'une partie de l'élément distodorsal gauche externe, avec une partie distale massive, un peu en sabot de cheval, à sole orientée ventralement. Cette sole est profondément découpée sur son pourtour par des replis au nombre de 12 à 15 environ, se terminant en pointe recourbée ventralement; la face ventrale de cette valve à un bord interne concave et présente son maximum de largeur vers les trois cinquièmes de sa longueur. La valve droite présente de 1 à 6 spinules à son extrémité. L'élément distodorsal gauche interne est en forme de languette courte, large à sa base et s'amincissant distalement; il est beaucoup plus court que l'élément distodorsal gauche externe et que l'élément spiralé. L'élément distodorsal gauche externe, en vue dorsale, présente une très profonde échancrure qui le divise en une partie externe assez large, vaguement bilobée, et une partie interne nettement plus étroite, plus ou moins arrondie dans sa partie distale (fig. 24 e). L'élément distoventral, en vue ventrale, se présente comme un petit os long avec ses extrémités renflées (fig. 24 d); en vue latérale externe, cet élément présente une base très élargie et une partie distale dont le bord dorsal, très concave, reçoit la partie interne de l'élément distodorsal gauche externe (fig. 24 e).

COLORATION. — GREY, DALL et BAKER (1983, pl. 20) ont publié une excellente photo en couleur de cette espèce. Elle y présente une coloration à dominante rose, avec des marbrures d'un rose plus vif.

TAILLE. — Le plus grand spécimen que nous ayons examiné est une femelle dont la longueur totale est de 130 mm (Le = 28,6 mm). RACEK (1973) cite une longueur totale de 140 mm (avec un poids de 40-42 g). Cette espèce fait donc partie des quelques *Metapenaeopsis* de grande taille.

REMARQUES. — RACEK et DALL (1965 : 26) rattachent à la bibliographie de *M. crassissima*, la référence de HALE (1927 : 39, fig. 31) relative à *Penaeopsis novae-guineae*. Je ne suis pas convaincu que cela soit justifié. La référence de HALE est relative à du matériel de Nouvelle-Guinée, dont l'appareil stridulant était formé de 5 à 20 crêtes, ce qui implique un mélange d'espèces (les spécimens à 5 crêtes étant très vraisemblablement des *M. stridulans*). *M. crassissima* se trouvait-il dans ce mélange d'espèces ? C'est possible, mais rien ne nous semble permettre de l'affirmer.

DISTRIBUTION. — Cette espèce est connue d'Australie. RACEK et DALL (1965 : 26), puis GREY, DALL et BAKER (1983 : 75) la signalent des côtes nord-ouest, ouest et sud (Coffin Bay, près de Port Lincoln). Cette dernière localité est inexacte. Nous avons pu examiner le spécimen (♀ 14,5 mm, AMS-P 14217) de Coffin Bay identifié à *M. crassissima* par RACEK & DALL, (1965 : 26). Il s'agit d'une *M. lindae* R. J. G. Manning, 1988, ce qui confirme que *M. crassissima* ne se trouve pas sur la côte sud australienne.

L'espèce a été signalée depuis 7 m jusqu'à 30 m de profondeur.

RAPSON et MCINTOSH (1972) mentionnent la présence de cette espèce en Papouasie Nouvelle-Guinée, mais d'après leur rédaction sans en avoir examiné eux-mêmes de spécimens et sans donner leur source d'information. Le Dr Alois C. WAFY (Dept. of Fisheries and Marine Resources de Papouasie Nouvelle-Guinée) m'a confirmé que cette espèce a été trouvée dans son pays, mais il n'a pu me fournir de spécimens permettant de vérifier l'exactitude de cette information. La présence de *M. crassissima* en Papouasie Nouvelle-Guinée semble, toutefois, très vraisemblable.

Source : MNHN, Paris

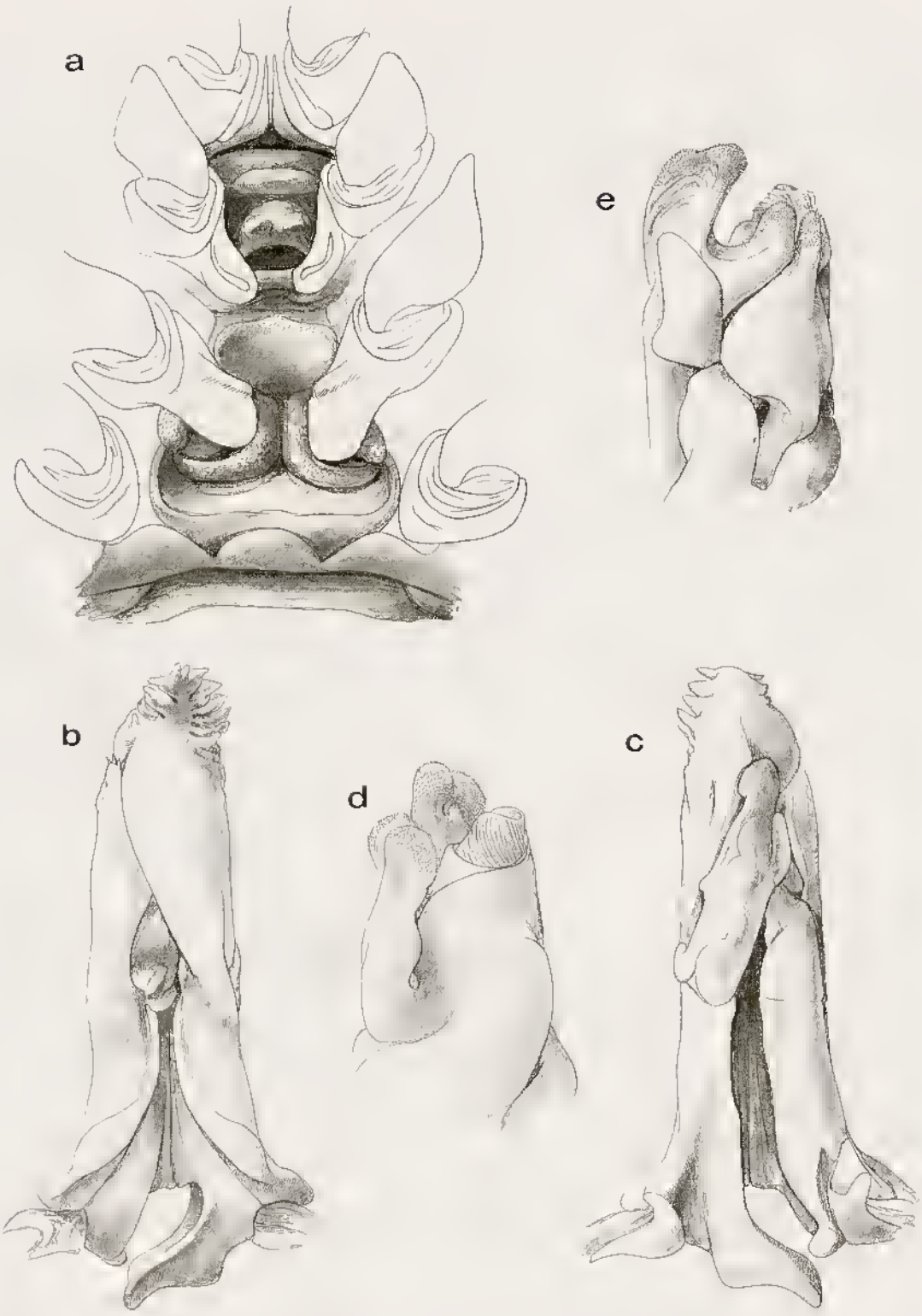

FIG. 24. — *Metapenaeopsis crassissima* Racek & Dall, 1965 : a, ♀ 22,8 mm, Australie, côte nord-ouest (MNHN-Na 12801) ; vue ventrale des sternites thoraciques V-VIII. — b-e, ♂ 22,5 mm, *ibidem* (MNHN-Na 12801). Pétasma : b, vue ventrale; c, vue dorsale; d, partie distale vue ventrale, valves enlevées; e, partie distale, vue du côté droit.

Source : MNHN, Paris

Metapenaeopsis barbata (de Haan, 1844)

Fig. 25-28

Penaeus barbatus de Haan, 1844, pl. 46, fig. 3.
Penaeus affinis - DE HAAN, 1849 : 192 . Non H. Milne Edwards, 1837.
Parapenaeus barbatus - SMITH, 1885 : 176.
Penaeus velutinus - BATE, 1888 : 253 (en partie, 4 ♀, st. 188 et 1 ♂, st. 233). — ORTMANN, 1890 : 452 (en partie, ♂ Osi-Indien seulement). — KISHINOUYE, 1900 : 26, pl. 6, fig. 3, pl. 7, fig. 11, 11A, 11 B. Non Dana, 1852.
Parapenaeus akayebi Rathbun, 1902 : 39.
Metapeneus akayebi - ALCOCK, 1905 : 518 (liste); 1906 : 50 (liste). — MAKI & TSUCHIYA, 1923 : 33, pl. 1, fig. 4.
Trachypenaeus barbatus - ALCOCK, 1906 : 58 (liste).
Penaeus (Metapenaeus) akayebi - DE MAN, 1907a : 433, pl. 33, fig. 54.
Penaeopsis barbatus - DE MAN, 1911 : 8 (liste). — HIRUMA, 1925 : 424, fig. 6, *fide* KUBO, 1949.
Penaeopsis stridulans - DE MAN, 1911 : 65 (en partie, voir remarques); 1913, pl. 7, fig. 20 b. Non Alcock, 1905.
Metapenaeus akayebi - URITA, 1921 : 215.
Erythropenaeus akayebi - YOKOYA, 1930 : 526.
Penaeopsis acclivis - OSADA, TANIZAKI & NAKAZAWA, 1931 : 7, pl. 4, fig. en bas et à gauche. Non Rathbun, 1902, *fide* KUBO, 1949.
Erithropenaeus akayebi - YOKOYA, 1933 : 8; 1941 : 54, pl. 1, fig. 12. — HORIKOSHI *et al.*, 1982 : 138, 174 (listes).
Metapenaeopsis barbatus - KUBO, 1949 : 413, fig. 1 D, 4 B, 8 B, 18 D-F, 22 M, 42 A-N, 46 B, 50 A-D, 64 A, 68 A-F, 76 C et H, 80 J, 146, 147 A-D, 148 A et I; 1960 : 109, pl. 54, fig. 8 (aquarelle). — YASUDA, 1956 : 379, 383-386, fig. 2a. — DALL, 1957 : 167 (clé). — YASUDA, SHINOOKA & KOBAYASHI, 1957 : 28 (liste). — LIU, 1959 : 36 (liste). — ELDRED & HUTTON, 1960 : 93 (liste). — CHEUNG, 1960 : 64 (clé); 1963 : 408, 409. — HALL, 1961 : 105, pl. 21, fig. 20. — CHIANG, 1965 : 12, fig. n. n.
Metapenacopsis barbata - MIYAKE, 1961a : 7 (liste); 1961b : 165, 167; 1975 : 99 (photo couleur); 1982 : 13, pl. 2, fig. 3 (photo couleur). — HALL, 1962 : 32, 181 (clé), fig. 116-116 c. — MIYAKE, K. SAKAI & NISHIKAWA, 1962 : 122 (liste). — HOLTHUIS & ROSA, 1965 : 2 (liste). — RACEK & DALL, 1965 : 19 (clé), 35, fig. 2 G, pl. 4, fig. 9-10, pl. 9, fig. 6. — GEORGE & MUTHU, 1970 : 286, fig. 1-5. — MUTHU, 1971 : 154. — RAPSON & MCINTOSH, 1972 : 25 (clé), 62, 83. — STAROBOGATOV, 1972 : 404, pl. 9, fig. 115 a-b. — GEORGE, 1972 : 2, 3. — MOTOH, 1972 : 31 (liste), 36, pl. 5, fig. 1-2; 1977 : 6 (liste). — LEE, 1972 : 272, 273 (listes). — KIM & PARK, 1972 : 193. — MISTAKIDIS, 1973 : 8, 24. — BURUKOVSKY, 1974 : 36 (édition de 1983 : 48), 43 g. — LUMUBOL, 1974 : 63, pl. 4, fig. 25, pl. 7, fig. 25, pl. 10, fig. 25. — CHAITIAMVONG & RATANA-ANATA, 1974 : 18, 19, pl. 20. — WEAR & STIRLING, 1974 : 100, 103, 107, fig. 10. — KIM, 1976 : 136; 1977a : 200 (liste); 1977b : 135, fig. 32 A-F, pl. 42, fig. 10. — UTINOMI, 1976 (1ère édition, 1956) : 57, pl. 28, fig. 4 (aquarelle). — LEE & YU, 1977 : 55, fig. 35, 36 A-F. — SAKAMOTO & HAYASHI, 1977 : 1262 (liste), fig. 3, 4. — FUJINO, 1978 : 19 (liste). — JOHNSON, 1979 : 4. — TAMAEI, 1979 : 260, 264 (liste), 265, fig. 26. — NATYANETR, 1980 : 15 (liste). — HOLTHUIS, 1980 : 14. — NAAMIN, 1980 : 58 et 60 (listes). — CHAITIAMVONG, 1980 : 94 (liste). — MIQUEL, 1981a : 2 (liste); 1981b : 5 (clé); 1981c : 7 (carte); 1984a : 213 (en partie, non spécimen de Port Sudan = *M. aegyptia* Galil & Golani, 1990), fig. 2 A-D. — LOVETT, 1981 : 42 (clé), fig. 84 a-d. — HAYASHI, 1982 : 188 (clé), 190, fig. 21, 23 b, 24 b, 25 b, 26 b; 1986 : 59, 240, fig. coul. 18; 1992 : 82 (clé), 84, fig. 4 a-c, 41, 43 b, 44 b, 45 b, 46 b. — TAKEDA, 1982 : 6, fig. 17. — TORIYAMA & HAYASHI, 1982 : 87, 103 (listes), tabl. 2, 3, 4, fig. 2, 5. — TSENG & CHENG, 1983 : 301, fig. 10. — TORO & MOOSA, 1984 b : 15. — YU & CHAN, 1986 : 32, 41 (clé), 150, fig. 12 D, 21 A, photos couleur n. n. — SAID *et al.*, 1987 : 139. — LIU, ZHONG *et al.*, 1988 : 216 (clé), 217, 268 (liste), fig. 132 1-7, 133, pl. 4, fig. 6 (aquarelle). — R. J. G. MANNING, 1988 : 93, 95, fig. 1 E-G. — LEELAPIYANART, 1989 : 220 (clé), 230, fig. 55 a-c, 82 a (photo couleur). — DALL, & ROTHLISBERG, 1990 : 74 (clé), 108. — DALL, 1990 : 142, 147. — YAMAGUCHI & BABA, 1993 : 206, fig. 30.
? *Penaeus velutinus* - KISHINOUYE, 1900 : 26, pl. 6, fig. 3, pl. 7, fig. 11 A-B. Non Dana, 1852.
? *Penaeopsis barbatus* - BALSS, 1914 : 8; 1933 : 230.
? *Metapenaeopsis barbata*, HALL, 1966 : 99. — HASSAN, 1978 : 389 (voir remarques infra).
Non *Penaeopsis barbatus* - PARISI, 1919 : 61, pl. 5, fig. 3. — BALSS, 1924 : 44 = *Metapenaeopsis acclivis* (Rathbun, 1902).
Non *Metapeneus barbatus* - MAKI & TSUCHIDA, 1923 : 35, pl. 3, fig. 3, *fide* KUBO : 418 = ? *M. dura* Kubo, 1949.
Non *Erythropenaeus akayebi* - KISHINOUYE, 1929, fig. du pétasma et du thélycum page 281. Pétasma = *M. acclivis* (Rathbun, 1902); thélycum = *M. acclivis* ou *M. dura* Kubo, 1949.
Non *Penaeopsis akayebi* - OSADA, TANIZAKI & NAKAZAWA, 1931 : 7, pl. 4, fig. en haut et à droite. — YOSHIDA, 1941 : 13 = *M. acclivis* (Rathbun, 1902), *fide* KUBO, 1949 : 421.
Non *Penaeopsis (Metapenaeopsis) barbata* - RACEK, 1959 : 10 = *M. novaeguineae* (Haswell, 1879).
Non *Metapenaeopsis barbata* - MICHEL, 1974 : 258 (voir remarques infra).

Source : MNHN, Paris

MATÉRIEL EXAMINÉ. — **Japon.** "*Challenger*" : st. 233, 34°39'N - 135°14'E, 15 m, 17.05.1875 : 1 ♂ 12,7 mm (BMNH).

Mimase (Kochi Prefecture), marché aux poissons, M. TORIYAMA coll., 26.09.1977 : 2 ♂ 17,3 et 18,3 mm; 2 ♀ 19,7 et 25,3 mm. — Tokushima, supermarché, K. SAKAI coll., 11.07.1985 : 3 ♂ 18,2 à 19,4 mm; 2 ♀ 23,4 et 24,7 mm. — Egawa, Kii Peninsula, Tanabe City, 50 m, 3.10.1988 : 11 ♂ 18,2 à 20,2 mm, 1 ♂ 18,4 mm (MNHN-Na 12798); 11 ♀ 19,8 à 24,5 mm, 1 ♀ 26,3 mm (MNHN-Na 12798). — Egawa, Shirahama, chalutage, K. SAKAI coll., 3.10.1988 : 4 ♂ 14,7 à 18,0 mm; 14 ♀ 14,5 à 20,3 mm; 1 ♀ 18,3 mm (MNHN-Na 12832). — Tosa Bay, Marché de Kochi City, K. SAKAI coll., 7.10.1988 : 3 ♂ 16,2 à 19,6 mm; 5 ♀ 17,6 à 25,3 mm. — Au large de Usa (Kochi Prefecture), 30 m, K. SAKAI coll., 7.10.1985 : 1 ♂ 18,9 mm.

Taiwan. Sans autre indication, D.-A. LEE leg. : 1 ♂ 14,8 mm; 3 ♀ 15,6 à 22,5 mm (MNHN-Na 9402). — Sans autre indication : 1 ♂ 17,8 mm (MNHN-Na 6952). — Kao-Hisiung County, 24.7.1985, T.-Y. CHAN coll. : 2 ♂ 17,5 et 17,8 mm; 2 ♀ 21,9 et 22,3 mm. — Ta-Chi, I-Lan County, 3.10.1988, T.-Y. CHAN coll. : 1 ♀ 20,4 mm. — *Ibidem*, 9.12.1984, T.-Y. CHAN coll. : 1 ♂ 18,0 mm; 2 ♀ 13,1 et 21,2 mm.

Hong Kong. "*Albatross*": st. 5303, 21°44'N - 114°48'E, 62 m, 9.08.1908 : 1 ♀ 19,4 mm (USNM). — St. 5305, 21°54'N - 114°46'E, 68 m, 24.10.1908 : 2 ♂ 15,3 et 18,3 mm (USNM).

Baie Mirs, avril 1989 : 1 ♂ 16,5 mm.

Vietnam. Chaifon, Usine de traitement de crevettes, N. A. ZARENKOV coll., 1960 : 1 ♀ 16,6 mm (MMSU).

Indonésie. "*Challenger*" : st. 188, 9°59'S - 139°42'E, 51 m, 10.09.1974 : 4 ♀ 8,3 à 12,2 mm (BMNH).

Détroit de Bangka (entre Sumatra et Bangka), 3°11'20"S - 106°20'50"E, K. MOOSA coll. : 4 ♂ 16,3 et 17,4 mm; 3 ♀ 20,4 et 24,0 mm (MNHN-Na 7702). — Mer de Java : 1 ♀ 17,2 mm. — Tjilatjap (côte sud de Java), J. C. MIQUEL coll., 2.05.1979 : 1 ♀ 19,1 mm (RMNH 33799).

"*Siboga*" : st. 296, 10°14'S - 124°5,5'E, Mouillage de Noimini, côte sud de Timor, 9-36 m, 24-26.01.1900 : 1 ♂ 6,0 mm; 1 ♀ 15,3 mm (ZMA).

CORINDON 2 (détroit de Makassar) : st. 201, 1°10,2'S - 117°06,1'E, 21 m, 30.10.1980 : 3 ♂ 13,6 à 15,9 mm; 4 ♀ 16,0 à 22,3 mm. — St. 203, 1°08,6'S - 117°06,4'E, 25 m, 30.10.1980 : 1 ♀ 17,2 mm.

Thaïlande. Don Sak, Fishing Pier, 19.05.1991 : 1 ♂ 17,4 mm (Dept. Fish. Bangkok).

Golfe du Bengale. GALATHEA EXPED. 1951-52 : 20°51'N - 87°58'E, 43-52 m, 26.04.1951 : 16 ♂ 12,8 à 16,0 mm; 16 ♀ 15,0 à 18,5 mm (ZMUC).

"*Ob*", st. 329, 30-40 m, chalutage, vase calcaire, 14.05.1957 : 2 ♂ 12,1 et 14,2 mm; 1 ♀ 14,9 mm (MMSU).

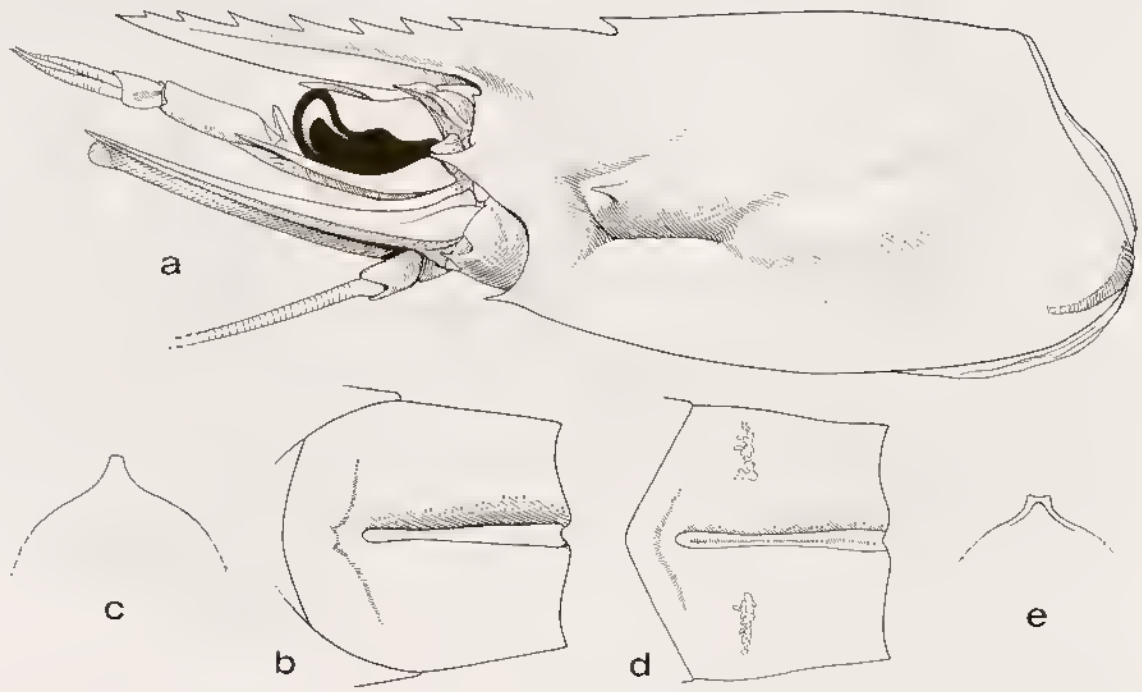

FIG. 25. — *Metapenaeopsis barbata* (de Haan, 1844) : **a-b**, ♀ 26,3 mm, Japon, Egawa (MNHN-Na 12798) : **a**, partie antérieure du corps; **b-c**, troisième segment abdominal, vue dorsale et coupe transversale. — **d-e**, ♀ 16,0 mm, "*Galathea*", golfe du Bengale (ZMUC), troisième segment abdominal, vue dorsale et coupe transversale.

Source : MNHN, Paris

"*Anton Bruun*". Cruise 1 : st. 46-63, 21°00'N - 91°59'E, au large du delta du Gange, 23-25 m, 5.04.1963 : 5 ♂ 12,3 à 14,4 mm; 5 ♀ 12,5 à 16,7 mm (MNHN). — St. 48-63, 19°41'N - 93°08'E, au large d'Akyab (Birmanie), 37 m, 5.04.1963 : 3 ♂ 11,5 à 13,1 mm; 9 ♀ 12,0 à 16,4 mm (USNM).

Madras, J. C. MIQUEL coll. 15.03.1979 : 2 ♂ 14,1 et 15,6 mm; 1 ♀ 14,7 mm (RMNH 33800).

"Ost-Indien" : 1 ♂ 12,0 mm (Muséum de Strasbourg, identifié *Penaeus velutinus* par ORTMANN, 1890).

Cette espèce se caractérise par :

— le rostre droit ou légèrement recourbé vers le haut, plutôt long (il atteint l'extrémité du pédoncule antennulaire) et portant 6 ou 7 dents, sans compter l'épigastrique.

— l'épine ptérygostomienne assez longue.

— l'appareil stridulant (fig. 26), qui comporte, chez l'adulte, de 16 à 27 crêtes, disposées sur un large arc de cercle, serrées, et dont la taille croît d'abord puis décroît d'avant en arrière. Chez les jeunes on peut observer des spécimens n'ayant pas plus de 12 crêtes.

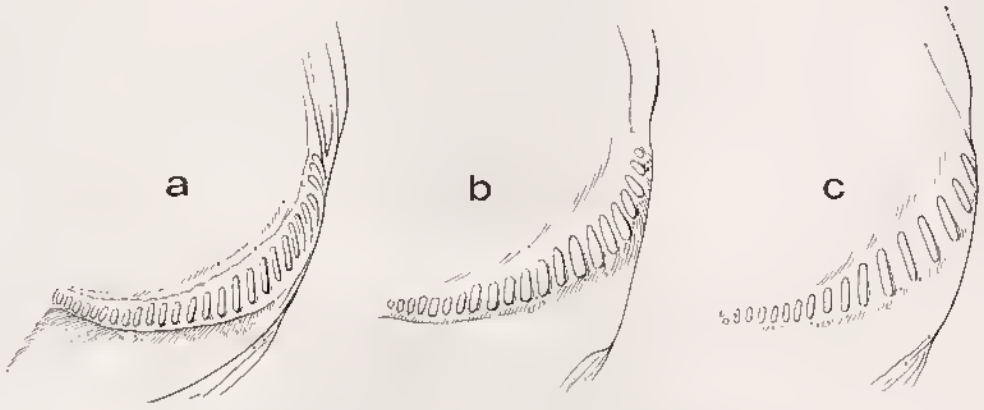

FIG. 26. — *Metapenaeopsis barbata* (de Haan, 1844), appareil stridulant : a, ♀ 26,3 mm, Japon, Egawa (MNHN-Na 12798); b, ♀ 18,3 mm, Japon, Egawa (MNHN-Na 12832); c, ♀ 18,3 mm, "*Galathea*", golfe du Bengale (ZMUC).

— la carène dorsale du troisième segment abdominal très en relief, assez large, lisse, plate (fig. 25 b-c) ou légèrement creusée transversalement et bordée par deux côtes (fig. 25 d-e). Antérieurement le contour de la carène est arrondi; d'avant en arrière, la largeur de la carène décroît très légèrement puis croît.

— le thélycum (fig. 27) dont la plaque thélycale est large (rapport l/L compris entre 1,7 et 2,0) et dont les expansions coxales des quatrièmes péréiopodes demeurent bien écartées l'une de l'autre, laissant la zone intermédiaire dégagée. Cette dernière est concave et lisse dans sa partie centrale; ses parties latérales portent chacune un léger renflement couvert de soies. La plaque transversale forme un bourrelet dessinant un arc dont les extrémités sont régulièrement arrondies ou légèrement angulaires. Les réceptacles séminaux s'ouvrent sur les côtés de la plaque intermédiaire; leurs ouvertures sont cachées par les expansions coxales des quatrièmes péréiopodes. Une paire de longues épines se trouve sur le sternum, entre les deuxièmes péréiopodes, et une paire de renflements arrondis, entre les troisièmes.

— le pétasma (fig. 28 a-b) qui présente une valve gauche beaucoup plus allongée que la droite, assez élancée, et dont la partie distale porte habituellement une dizaine (rarement une quinzaine) de lobules en forme de digilation. La valve droite, qui coiffe étroitement l'élément distoventral, a son extrémité parfois arrondie, parfois tronconique, et présente à son extrémité un minuscule diverticule découpé en deux, trois ou quatre digitations (fig. 28 f). L'élément distodorsal gauche interne, en forme de lame, a sa partie distale plus large que la basale et son bord externe nettement plus court que l'interne; son extrémité se situe au niveau de celle de l'élément spiralé (fig. 28 c). L'élément distodorsal gauche externe est nettement plus court que l'interne; en vue ventrale, sa partie distale arrondie est parfois flanquée, du côté interne, par un denticule (fig. 28 d); en vue externe, cet élément présente une forte expansion dorsale sur sa moitié basale (fig. 28 e). L'élément distoventral a un bord externe d'abord droit puis recourbé en forme de quart de cercle, qui se termine dans une protubérance en forme de museau; sa face ventrale présente, dans sa partie basale, une forte protubérance ventrale arrondie (fig. 28 d).

Source : MNHN, Paris

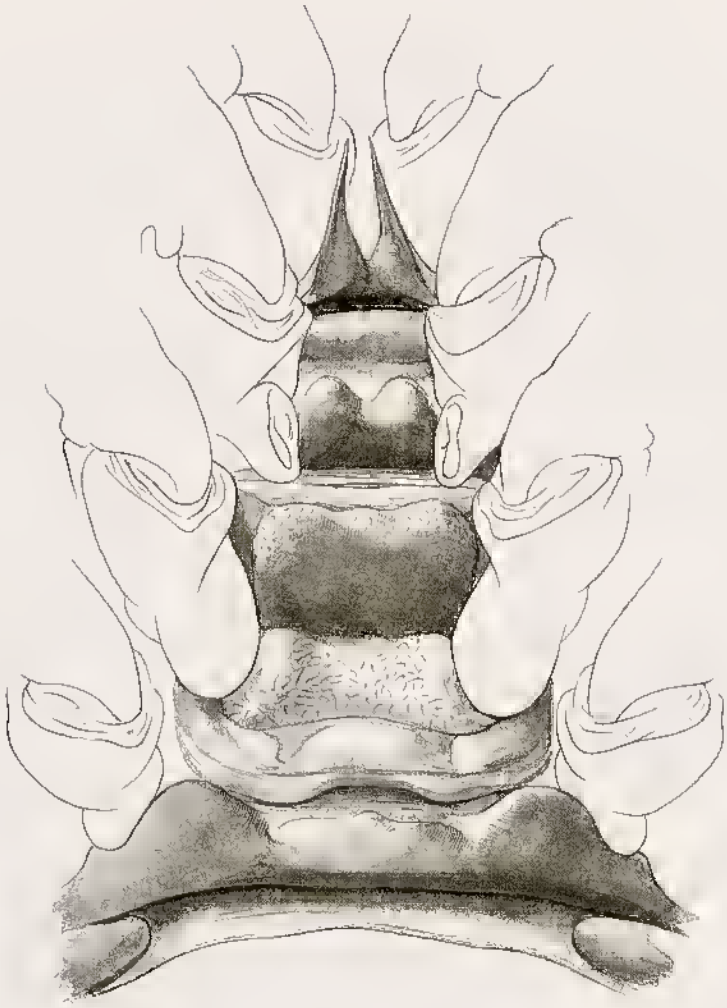

FIG. 27. — *Metapenaeopsis barbata* (de Haan, 1844), ♀ 26,3 mm, Japon, Egawa (MNHN-Na 12798), vue ventrale des sternites thoraciques V-VIII.

COLORATION. — Plusieurs photos en couleurs ou aquarelles de cette espèce ont été publiées [KUBO, 1960; UTINOMI, 1976 (1956); MIYAKE, 1975; 1982; HAYASHI, 1986; LEELAPIYANART, 1989]. Elles montrent un animal marbré avec une forte tonalité rouge brun assez vif sur fond blanchâtre ou jaunâtre. L'extension des taches rouge brun est relativement variable mais l'on observe toujours, sur la carapace, une forte tache au contour irrégulier sur la moitié antérieure de la région branchiale. Les péréiopodes sont fortement colorés, souvent sur toute leur longueur; sinon ils sont décolorés dans leurs parties basale et distale. Les pléopodes ont leur partie antérieure rouge brun et leur partie postérieure blanchâtre (particulièrement celle du protopodite). Les uropodes, particulièrement l'externe, sont bien colorés sauf sur leur partie basale et à leur extrémité.

TAILLE. — Le plus grand spécimen que nous ayons observé, une femelle, avait une longueur totale de 116 mm (Lc = 24,7 mm). HAYASHI (1982) indique 120 mm comme taille maximale.

REMARQUES. — On observe, chez cette espèce, suivant les zones de récoltes, des variations de la forme de la carène du troisième segment abdominal ; tous les spécimens récoltés au Japon, à Taiwan et à Hong Kong que nous avons examinés ont une carène large, plate et lisse (fig. 25 b-c). Les spécimens d'Indonésie ont une carène soit identique à celle des spécimens japonais, soit plus ou moins creusée en gouttière. Chez les spécimens de Thaïlande et de l'Inde, la carène est nettement creusée en gouttière (fig. 25 d-e).

Source : MNHN, Paris

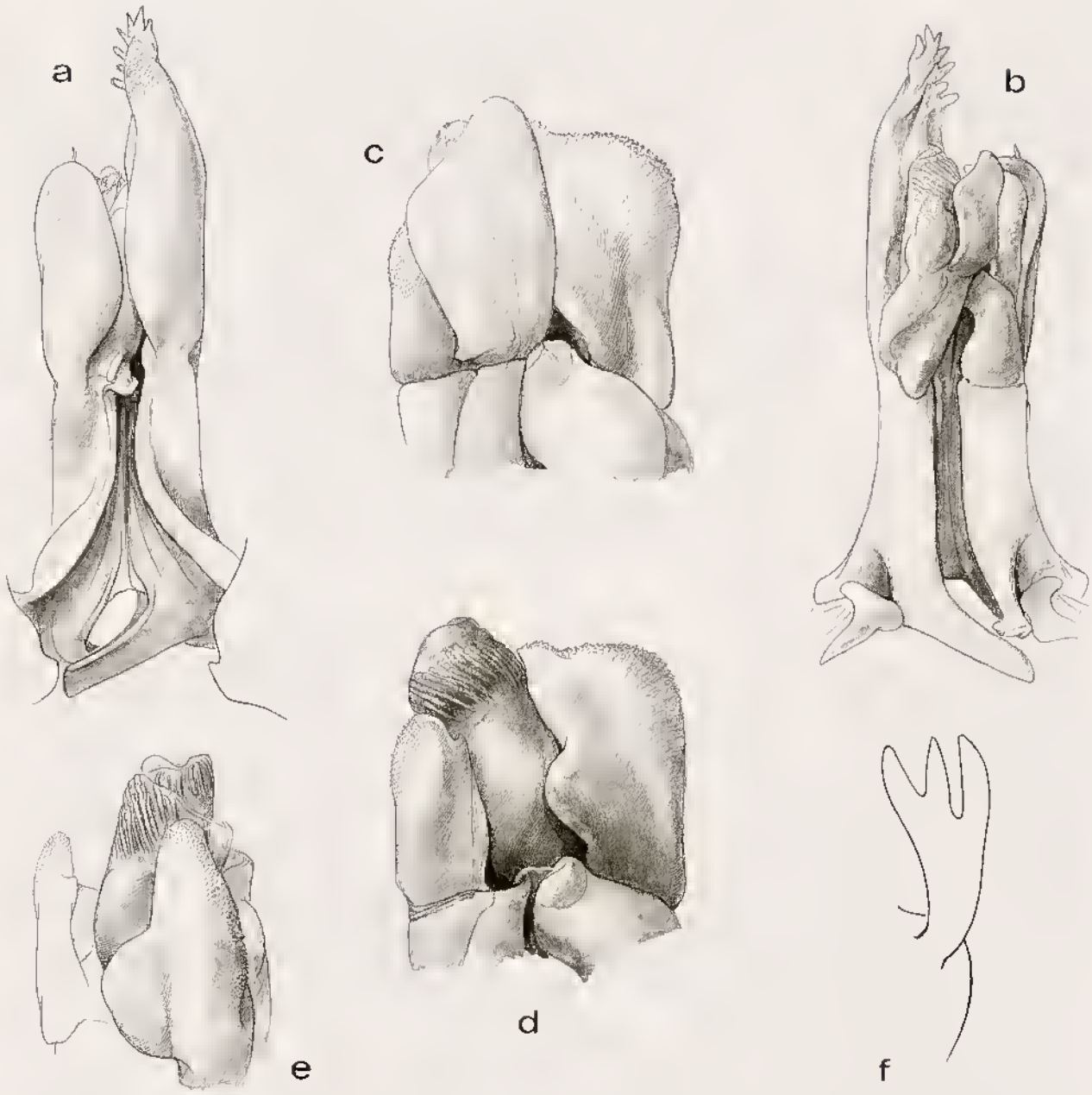

FIG. 28. — *Metapenaeopsis barbata* (de Haan, 1844), ♂ 18,4 mm, Japon, Egawa (MNHN-Na 12798). Pétasma : **a**, vue dorsale; **b**, vue ventrale; **c**, vue dorsale de la partie distale, valves enlevées; **d**, même vue, avec l'élément distodorsal gauche interne enlevé; **e**, vue latérale droite de la partie distale avec l'élément distodorsal gauche interne enlevé; **f**, diverticule distal de la valve droite.

BATE (1888 : 253) a identifié de nombreux spécimens à *Penaeus velutinus*. Tous n'existent plus dans les collections du British Museum. Nous avons pu examiner ceux restants (st. 184 : 1 ♂ et 1 ♀, au lieu de 2 ♀ d'après BATE; st. 186 : 1 ♂ et 1 ♀, comme annoncé par BATE; st. 187 : 1 ♀, au lieu de 2 ♀; st. 188 : 8 ♂ et 7 ♀, au lieu de 25 ♂, 18 ♀ et 2 juv.; st. 190 : 2 ♂ et 4 ♀, au lieu de 7 ♂ et 12 ♀; st. 233 : 7 ♂, au lieu de 10 ♂ et 11 ♀; st. 234 : 2 ♀, comme annoncé par BATE). Aucun de ces spécimens n'appartient à *M. velutina*, comme nous l'avons déjà signalé (CROSNIER, 1991 : 248); tous, à l'exception d'un qui est un *Metapenaeus anchistus* (de Man, 1920), sont des *Metapenaeopsis* à crête stridulante se répartissant en cinq espèces : *M. acclivis*

Source : MNHN, Paris

(Rathbun, 1902); *M. barbata* (de Haan, 1844); *M. fusca* R. J. G. Manning, 1988; *M. palmensis* (Haswell, 1879); *M. novaeguineae* (Haswell, 1879); *M. rosea* Racek & Dall, 1965. Les spécimens appartenant à *M. barbata* sont 4 femelles de la station 188 (sud de l'Irian Jaya) et 1 mâle de la station 233 (Japon). Ceci dit il y a manifestement eu des mélanges d'étiquettes; c'est le cas de l'échantillon supposé avoir été récolté à la station 184 à 1400 brasses de profondeur (2560 m) et qui renferme un mâle de *Metapenaeus auchistus* et une femelle de *M. novaeguineae* (au lieu de 2 femelles de *M. velutina* d'après BATE), et de l'échantillon étiqueté "st. 234, 2675 fms" (4892 m) qui renferme 2 femelles de *M. acclivis*; il est bien évident qu'aucune des ces espèces ne peut avoir été récoltée à de telles profondeurs.

DE MAN (1911 et 1913), étudiant les récoltes de la "*Siboga*", a identifié 18 récoltes à *M. stridulans*. Comme nous l'avons exposé à propos de cette dernière espèce (voir page 271), aucun des spécimens composant ces récoltes ne lui est identifiable. Par contre, ceux de deux d'entre elles (st. 162 et 296) sont des *M. barbata*, ainsi vraisemblablement que le jeune mâle de la station 163 et une partie des spécimens de la station 273.

Il est impossible de savoir si les identifications de BALSS, relatives à son travail de 1933, sont exactes, sans réexaminer son matériel, ce que nous n'avons pu faire. BALSS (1933 : 231) note que *M. barbata* est une espèce très variable et met en synonymie avec elle *M. acclivis* (Rathbun, 1902), *M. stridulans* (Alcock, 1905), *M. novaeguineae* (Haswell, 1879) et *M. palmensis* (Haswell, 1879), toutes espèces qui sont cependant valides.

KUBO (1949 : 418) pense que le *Penaeus velutinus* de KISHINOUYE (1900) concerne probablement un mélange de *M. barbata* et de *M. dura* Kubo, 1949. Pour cela, il se base essentiellement sur les dessins du pétasma publiés par KISHINOUYE qui lui paraissent plus proches du pétasma de *M. dura* que de celui de *M. barbata*. Nous devons avouer que ce dessin est si mal détaillé que nous ne sommes pas en état d'avoir une opinion personnelle tranchée sur la question.

KUBO (1949 : 418) mentionne que le *Metapenaeus barbatus* de MAKI et TSUCHIYA (1923 : 35, pl. 4, fig. 3), récolté à Taiwan, n'appartient pas à *M. barbata*, car les troisièmes péréiopodes atteignent l'extrémité du scaphocérite et les plaques coxales des quatrièmes péréiopodes de la femelle seraient absentes. Nous ne pouvons avoir d'opinion personnelle, la publication de MAYI et TSUCHIYA, dont nous ne possédons qu'une mauvaise photocopie, étant en chinois.

Les références de HALL (1966) et HASSAN (1978) qui mentionnent cette espèce, le premier au large de la Tanzanie, le second dans le golfe Persique, sont vraisemblablement erronées, *M. barbata* n'ayant jamais été signalée de ces régions. Il est vraisemblable que, dans les deux cas, il s'agit de *M. aegyptia* Galil & Golani, 1990. Il faudrait pouvoir réexaminer les spécimens de ces auteurs. Nous avons vainement essayé de nous les procurer, notamment ceux de HASSAN qui doivent se trouver à Saint Pétersbourg.

MIQUEL (1984a) a signalé *M. barbata* à Port Soudan, en mer Rouge. Nous avons pu réexaminer le spécimen de MIQUEL, une femelle (Lc = 11,4 mm), et constater qu'il devait être identifié à *M. aegyptia* Galil & Golani, 1990.

Quant à la présence de *M. barbata* à l'île Maurice, mentionnée par MICHEL (1974), elle ne peut être retenue. Cet auteur a déduit cette information du travail de RICHTERS (1880) qui signale, sans aucun détail autre que le lieu de récolte (Fouquets), *Penaeus velutinus* Dana, *Metapenaeopsis* sans crête stridulante (cf. CROSNIER, 1991 : 247), à l'île Maurice. Pour connaître l'identité du spécimen examiné par RICHTERS, il faudrait pouvoir le réexaminer, ce qui n'a pas été possible.

DISTRIBUTION. — Cette espèce a été récoltée du Japon et de la Corée du Sud à la Malaisie, la Thaïlande (y compris le Sarawak et le Sabah), le Brunei et l'Indonésie (à l'est jusqu'à l'Irian Jaya). Elle a également été signalée dans le golfe du Bengale, au large de Visakhapatnam (17°40'N - 83°20'E, GEORGE & MUTHU, 1970) et de Madras (MIQUEL, 1984a). Nous en avons examiné de nombreux exemplaires capturés par la "*Galathea*" au large de l'estuaire du Gange. Par contre, cette espèce ne semble pas avoir été signalée des Philippines où elle doit pourtant se trouver.

Comme nous l'avons indiqué, les mentions de cette espèce faites au large de la Tanzanie (HALL, 1966), à l'île Maurice (MICHEL, 1974) et dans le golfe Persique (HASSAN, 1978), nous paraissent peu vraisemblables.

Curieusement, on ne possède que des renseignements fragmentaires sur la répartition bathymétrique de *M. barbata* qui semble souvent très commune. HOLTHUIS (1980) indique 20-70 m, JOHNSON (1979), 2-90 m, LIU, ZHONG *et al.* (1988) donnent 5-219 m, cette dernière profondeur paraît peu vraisemblable.

Source : MNHN, Paris

Metapenaeopsis toloensis Hall, 1962

Fig. 29-30

Metapenaeopsis toloensis Hall, 1962 : 33, 181 (clé), fig. 119, 119 a-d. — De Bruin, 1965 : 85; 1970 : 71-73. — Bruce, 1965 : 290. — Racek & Dall, 1965 : 18 (clé). — Longhurst, 1970 : 283. — Starobogatov, 1972 : 375, 402 (clé), pl. 9, fig. 109 a-b. — Racek, 1973 : 155 (liste), 159 (clé). — Burukovsky, 1974 : 35 (clé) (édition de 1983 : 46). — Chaitiamvong & Ratana-Ananta, 1974 : 18 (clé), 19, pl. 25, 3 fig. n. n. — Lumubol, 1974 : 55, 58, pl. 3, fig. 22, pl. 7, fig. 22, pl. 9, fig. 22. — Wear & Stirling, 1974 : 103 (clé), 107 (liste). — Holthuis, 1980 : 19. — Naiyanetr, 1980 : 15 (liste). — Chaitiamvong, 1980 : 95 (liste). — Lovett, 1981 : 42 (clé), fig. 85 a-c. — Miquel, 1981 a : 2 (liste); 1981 c : 7 (carte); 1984 a : 214; 1984 b, fiche PEN Meta 17, 5 fig. n. n., 1 carte. — Hayashi, 1982 : 188 (clé); 1992 : 81 (clé), 92, fig. 42 d, 45 e, 46 e. — Motoh & Buri, 1984 : 77, fig. 52, 53, 54 C. — Said *et al.*, 1987 : 135, 139-141. — Liu, Zhong *et al.*,1988 : 230, pl. 140, fig. 1-8. — Leelapiyanart, 1989 : 220 (clé), 235, pl. 56, fig. a-c, pl. 82, fig. b (photo coul.). — Dall & Rothlisberg, 1990 : 73 (clé). — Dall, 1990 : 143. — Chaitiamvong & Supongpan, 1992 : 27 (clé), pl. 19 (photo coul.). — Mustafa, 1993 : 183, fig. 1.

Metapenaeopsis tolaensis (sic) - Miquel, 1981 b : 5 (clé).

Metapenaeus stridulans - Alcock, 1906 : 27 (en partie), fig. 14 b. — Borradaile, 1910 : 257 (en partie, 4 ♀ récoltées dans les atolls Nilandu et Haddummati). Non Alcock, 1905.

Matériel examiné. — **Japon**, Baie de Shijiki, Préfecture de Nagasaki, 15 m, 18.06.1976 : 3 ♂ 11,2 à 11,5 mm. — *Ibidem*, 10 m, 24.07.1980 : 1 ♀ 15,0 mm.

Thaïlande, Golfe de Thaïlande, Prachuap kiri Khan Province, 24 m, 12.02.1992, P. Naiyanetr pres. : 10 ♂ 10,0 à 12,6 mm; 7 ♀ 9,2 à 12,5 mm. — *Ibidem*, 28 m, 13.02.1990, P. Naiyanetr pres. : 5 ♂ 10,6 à 15,5 mm; 8 ♀ 6,5 à 16,5 mm.

Vietnam, "*Orlik*" : Golfe du Tonkin : 20°16,0'N - 107°28,0'E, 32 m, 18.01.1960 : 4 juv. (MMSU). — 20°0,0'N - 107°40,0'E, 29 m, 19.01.1960 : 1 juv.; 1 ♂ 13,7 mm; 1 ♀ 12,4 mm (MMSU). — 18°40,0'N - 106°11,6'E, 23 m, 21.01.1960 : 3 ♂ 11,6 à 14,0 mm; 4 ♀ 11,6 à 13,6 mm (MMSU).

Chaifon, Usine de traitement de crevettes, N. A. Zarenkov coll., 1960 : 1 ♂ 19,7 mm; 1 ♀ 22,5 mm (MMSU).

Philippines, "*Albatross*" : st. 5152, 5°22'55"N - 120°15'45"E, SW de l'île Pajumajan, 62 m, 18.02.1908 : 3 ♂ 8,3 à 15,1 mm (USNM). — St. 5181 : 11°36'40"N - 123°26'35"E, 6,6 miles au SW de l'île Antonia (Panay), 48 m, 27.03.1908 : 4 ♂ 10,3 à 12,5 mm; 2 ♀ 11,2 et 15,0 mm (USNM). — St. 5327, 18°31'30"N - 122°03'E, à l'ouest du cap Engaño (N. Luzon), 362 m (!), 12.11.1908 : 1 ♂ 10,1 mm; 1 ♀ 7,3 mm (USNM).

Musorstom 3 : st. CP 142, 11°47'N - 123°02'E, 26-27 m, 6.06.1992 : 39 ♂ 8,7 à 12,7 mm; 34 ♀ 7,3 à 14,1 mm.

Indonésie, Sumatra, 2°01'S - 106°58'E, 32 m, sable et alcyonaires, 28.04.1993 : 1 ♂ 14,0 mm; 1 ♀ 21,2 mm (MNHN-Na 7700).

Mariel King Memorial Exped., Moluccas 1970 : st. KR VI 3-10, îles Kai (nord de Nuhu Rowa), 5°32'S - 133°41'E, 27-37 m, sable et gravier, 11.06.1970 : 1 ♂ 7,0 mm; 1 ♀ 7,2 mm (WAM 197-89).

Maldives, Atoll Nilandu, J. S. Gardiner coll. : 3 ♀ 6,5 à 8,5 mm (UMZC). — Atoll Haddummati, J. S. Gardiner coll. : 1 ♀ 10,2 mm (UMZC). Identifiées à *M. stridulans* par Borradaile, 1910.

Sri Lanka, *Côte est* : au large de Mullaitivu; G. H. P. de Bruin coll. : 2 ♂ 12,5 et 13,4 mm; 2 ♀ 13,4 et 13,8 mm (MNHN-Na 6926). — 80 miles au nord de Trincomalee, G. H. P. de Bruin coll., août 1960 : 1 ♂ 13,5 mm; 1 ♀ 16,0 mm (ZMUC).

Australie, *Côte nord* : "*Soela*", Cr 0682, st. 130, 19°28,5'S - 118°29,9'E, 52 m, 10.12.1989 : 10 ♂ 12,6 à 14,3 mm; 1 ♂ 14,4 mm (MNHN Na-12820); 15 ♀ 14,5 à 21,7 mm.

Côte est : au nord-est de Townsville, 36 m, sable vaseux, G. C. B. Poore et H. M. Lew Ton coll. : 1 ♂ 14,2 mm (VM).

Îles Chesterfield, Chalcal 1 : st. D 22, 19°12,00'S - 158°37,00'E, 68 m : 4 ♂ 4,8 à 7,5 mm. — St. CP 12, 20°35,30'S - 158°47,40'E, 67 m, 23.07.1984 : 1 ♀ 7,5 mm.

Corail 2 : st. DW 47, 19°18,28'S - 158°23,06'E, 54 m, 23.07.1988 : 4 ♂ 7,5 à 12,4 mm; 3 ♀ 7,8 à 14,0 mm. — St. DW 68, 19°15,00'S - 158°34,00'E, 65 m, 24.08.1988 : 2 ♂ 5,6 et 14,4 mm. — St. DW 73, 19°12,11'S - 158°22,57'E, 41 m, 25.08.1988 : 1 ♂ 12,8 mm. — St. DW 74, 19°12,12'S - 158°26,60'E, 62 m, 25.08. 1988 : 1 ♂ 12,7 mm.

Nouvelle-Calédonie, Obtenus par dragages, ces spécimens sont presque tous petits et n'ont pas été mesurés.

Lagon. *Lagon nord* : st. 437 (Atoll de Huon), 18°08,1'S - 162°50,2'E, 40 m, blocs et foraminifères, 25.02.1985 : 3 ♂; 4 ♀. — St. 438 (Atoll de Huon), 18°10,0'S - 162°50,9'E, 37 m, sable blanc, 25.02.1985 : 2 ♂. — St. 440 (Atoll de Huon), 18°05,3'S - 162°55,0'E, 39 m, blocs, 25.02.1985 : 1 ♂; 7 ♀. — St. 447 (Atoll de Surprise), 18°20,3'S - 163°05,5'E, 36 m, sable blanc à *Heteropsammia*, 28.02.1985 : 6 ♂; 4 ♀. — St. 448 (Atoll de Surprise), 18°21,5'S - 163°07,0'E, 30 m, sable blanc coquillier, 28.02.1985 : 5 ♂; 5 ♀. — St. 450 (Atoll de Surprise), 18°23,9'S - 163°24,0'E, 29 m, sable blanc coquillier, 28.02.1985 : 1 ♂. — St. 451 (Atoll de Surprise), 18°25,4'S - 136°11,3'E, 30 m, sable blanc fin, 28.02.1985 : 1 ♂. — St. 471 (Atoll de Surprise), 18°27,7'S - 163°06,6'E, 42 m, sable blanc grossier coquillier, 1.03.1985 : 1 ♂; 1 ♀. — St. 1042, 20°02,9'S - 164°02,4'E, 16 m, sable grossier vaseux à foraminifères, 4.05.1988 :

Source : MNHN, Paris

1 ♂. — St. 1067, 19°55,8'S - 163°52,8'E, 28 m, spongiaires et caulerpes, 23.10.1989 : 1 ♂. — St. 1068, 19°57,3'S - 163°52,8'E, 26 m, algues, *Amusium*, 23.10.1989 : 1 ♀. — St. 1070, 19°54,4'S - 163°56,2'E, 29 m, sable vaseux, *Halimeda*, 23.10.1989 : 1 ♂. — St. 1073, 19°59,8'S - 164°03,0'E, 28 m, sable blanc grossier à foraminifères, *Halimeda*, 23.10.1989 : 1 ♀. — St. 1080, 19°59,0'S - 163°45,2'E, 34 m, sable grossier vaseux, turitelles, 24.10.1989 : 3 ♂. — St. 1081, 19°57,0'S - 163°42,9'E, 34 m, sable fin vaseux, foraminifères, 24.10.1989 : 1 ♀. — St. 1094, 19°54,4'S - 163°41,2'E, 37 m, sable grossier à foraminifères, *Halimeda*, blocs, 24.10.1989 : 1 ♂. — St. 1095, 19°53,1'S - 163°38,2'E, 29 m, sable blanc grossier, 24.10.1989 : 1 ♀. — St. 1102, 19°43,3'S - 163°54,2'E, 38 m, sable grossier vaseux, turitelles, 25.10.1989 : 2 ♀. — St. 1114, 19°38,4'S - 163°50,4'E, 43 m, sable grossier vaseux, turitelles, 25.10.1989 : 1 ♂. — St. 1137, 19°27,1'S - 163°43,3'E, 51 m, sable fin vaseux, *Amusium*, turitelles, 26.10.1989 : 1 ♀. — St. 1106, 19°40,3'S - 163°53,2'E, 39 m, sable blanc vaseux, 25.10.1989 : 1 ♂; 1 ♀. — St. 1116, 19°37,3'S - 163°52,6'E, 38 m, sable grossier vaseux, turitelles, 25.10.1989 : 1 ♂. — St. 1138, 19°26,5'S - 163°46,5'E, 42 m, sable blanc à foraminifères, 26.10.1989 : 1 ♀. — St. 1162, 19°12,2'S - 163°17,5'E, 62 m, sable fin vaseux, turitelles, 30.10.1989 : 1 ♂. — St. 1175, 19°20,9'S - 163°37,7'E, 62 m, sable grossier vaseux, turitelles, *Amusium*, 31.10.1989 : 1 ♀. — St. 1188, 19°33,9'S - 163°34,7'E, 33 m, sable fin vaseux, *Amusium*, 1.11.1989 : 1 ♀. — St. 1191, 19°35,3'S - 163°37,5'E, 45 m, sable fin vaseux, *Amusium*, 1.11.1989 : 1 ♀. — St. 1197, 19°35,6'S - 163°22,1'E, 41 m, foraminifères, 1.11.1989 : 1 ♀ — St. 1205, 19°41,6'S - 163°25,6'E, 38 m, sable grossier à foraminifères, 2.11.1989 : 3 ♀. — St. 1211, 19°46,4'S - 163°32,9'E, 35 m, sable grossier vaseux, 3.11.1989 : 1 ♂. — St. 1216, 19°50,4'S - 163°38,4'E, 30 m, sable grossier à foraminifères, 3.11.1989 : 1 ♂; 1 ♀.

Lagon nord-ouest : st. 919, 20°52,2'S - 164°25,2'E, 17 m, sable grossier, 26.04.1988 : 1 ♀. — St. 932, 20°46,3'S - 164°16,5'E, 23 m, sable fin, phanérogames, 27.04.1988 : 1 ♂. — St. 936, 20°40,7'S - 164°16,4'E, 15 m, sable vaseux coquillier, 27.04.1988 : 1 ♀. — St. 945, 20°34,6'S - 164°09,8'E, 15-16 m, sable gris coquillier à *Halimeda*, 28.04.1988 : 2 ♀. — St. 972, 20°24,8'S - 163°57,8'E, 27 m, sable blanc-gris, 29.04.1988 : 2 ♂; 1 ♀. — St. 984, 20°21,2'S - 163°56,1'E, 23 m, sable fin, foraminifères, 30.04.1988 : 1 ♂; 1 ♀. — St. 990, 20°19,0'S - 163°55,3'E, 22-23 m, sable coquillier à foraminifères, 30.04.1988 : 1 ♀. — St. 995, 20°15,1'S - 163°54,7'E, 36 m, sable à foraminifères et *Halimeda*, 2.05.1988 : 1 ♂. — St. 1005, 20°11,4'S - 163°56,4'E, 17 m, 2.05.1988 : 10 ♂; 10 ♀. — St. 1009, 20°09,9'S - 163°51,1'E, 20 m, sable grossier coquillier, huitres, *Heteropsammia*, 2.05.1988 : 2 ♂. — St. 1015, 20°10,1'S - 163°51,6'E, 25 m, fond dur, sargasses, *Heteropsammia*, *Halimeda*, 3.04.1988 : 1 ♂; 5 ♀. — St. 1017, 20°07,5'S - 163°51,0'E, 21 m, blocs et *Halimeda*, 3.04.1988 : 1 ♂. — St. 1024, 20°05,5'S - 163°50,3'E, 26 m, sable fin, *Heteropsammia*, *Halimeda*, 3.04.1988 : 3 ♂; 2 ♀. — St. 1049, 20°08,1'S - 164°08,4'E, 8-12 m, 4.05.1988 : 1 ♂.

Lagon sud-ouest : st. 50, 22°16,6'S - 166°12,2'E, 12 m, sable blanc, 25.05.1984 : 1 ♂. — St. 152, 22°32,3'S - 166°42,8'E, 23 m, sable grossier à *Heteropsammia*, 24.08.1984 : 1 ♀. — St. 158, 22°36,1'S - 166°34,4'E, 22 m, sable blanc, *Heteropsammia*, 24.08.1984 : 2 ♀. — St. 163, 22°12,0'S - 166°07,5'E, 15 m, sable clair grossier à foraminifères, 18.09.1984 : 1 ♂. — St. 176, 22°05,8'S - 166°04,2'E, 15 m, sable à *Halimeda*, sargasses, 18.09.1984 : 2 ♂; 1 ♀. — St. 187, 22°02,8'S - 166°01,7'E, 13 m, sable gris coquillier, coraux, 19.09.1984 : 2 ♂. — St. 199, 22°01,7'S - 165°59,7'E, 50 m, vase, 20.09.1984 : 1 ♂. — St. 244, 22°25,0'S - 166°59,6'E, 47 m, sable grossier, 23.10.1984 : 1 ♀. — St. 254, 22°23,5'S - 166°21,3'E, 8 m, sable blanc, foraminifères, 7.11.1984 : 1 ♂. — St. 264, 22°18,5'S - 166°20,0'E, 19 m, sable grossier coquillier, foraminifères et *Halimeda*, 7.11.1984 : 1 ♂. — St. 315, 22°37,0'S - 166°52,7'E, 50 m, sable vaseux, foraminifères, 27.11.1984 : 1 ♂; 1 ♀. — St. 334, 22°38,0'S - 166°53,6'E, 47 m, 28.11.1984 : 1 ♂. — St. 550, 22°54,0'S - 166°57,5'E, 22-26 m, sable blanc et débris coralliens, 15.07.1985 : 1 ♀. — St. 557, 22°46,6'S - 166°53,5'E, 45 m, sable blanc grossier à foraminifères, 16.07.1985 : 1 ♂.

Lagon est : st. 892, 20°18,3'S - 164°32,15'E, 26 m, sable grossier et débris, *Halimeda*, 14.01.1987 : 2 ♂. — St. 895, 20°15,5'S - 164°26,8'E, 16 m, sable grossier, *Heteropsammia*, *Halimeda*, 14.01.1987 : 1 ♀. — St. 903, 20°13,0'S - 164°17,8'E, 42 m, coquilles de Pectinidae, coraux, 14.01.1987 : 1 ♂. — St. 1050, 20°09,9'S - 164°09,4'E, 12 m, sable grossier coquillier, inaërl, 4.05.1988 : 1 ♂. — St. 1053, 20°11,5'S - 164°13,4'E, 13 m, sable grossier, 4.05.1988 : 4 ♂; 2 ♀. — St. 1056, 20°12,1'S - 164°15,7'E, 20-22 m, sable grossier vaseux, *Heteropsammia*, 5.05.1988 : 2 ♂; 7 ♀.

Campagne aux îles Belep : st. 4, 19°32,5'S - 163°35,3'E, 39-41 m, 22.06.1985 : 1 ♂; 1 ♀.

Campagne au récif Cook : st. 14, 19°40,6'S - 163°40,1'E, 42 m, 15.06.1985 : 1 ♀.

Cette espèce se caractérise par :

— le rostre droit ou légèrement recourbé vers le haut, légèrement dressé, atteignant l'extrémité du deuxième article du pédoncule antennulaire ou un peu au delà, et portant 7 ou 8 dents (parfois 9 d'après CHAITIAMVONG & RATANA-ANANTA, 1974 : 19), sans compter l'épigastrique.

— l'épine ptérygostomienne modérément développée.

— l'appareil stridulant qui comporte chez l'adulte de 16 à 25 crêtes (le plus souvent de 16 à 19) disposées sur un arc de cercle, et dont la taille et l'espacement croissent d'avant en arrière (fig. 29 b). Un juvénile (Lc = 7,3 mm) ne présentait que 13 crêtes.

— la carène dorsale du troisième segment abdominal creusée, sur toute sa longueur, par un profond sillon (fig. 29 c-d).

Source : MNHN, Paris

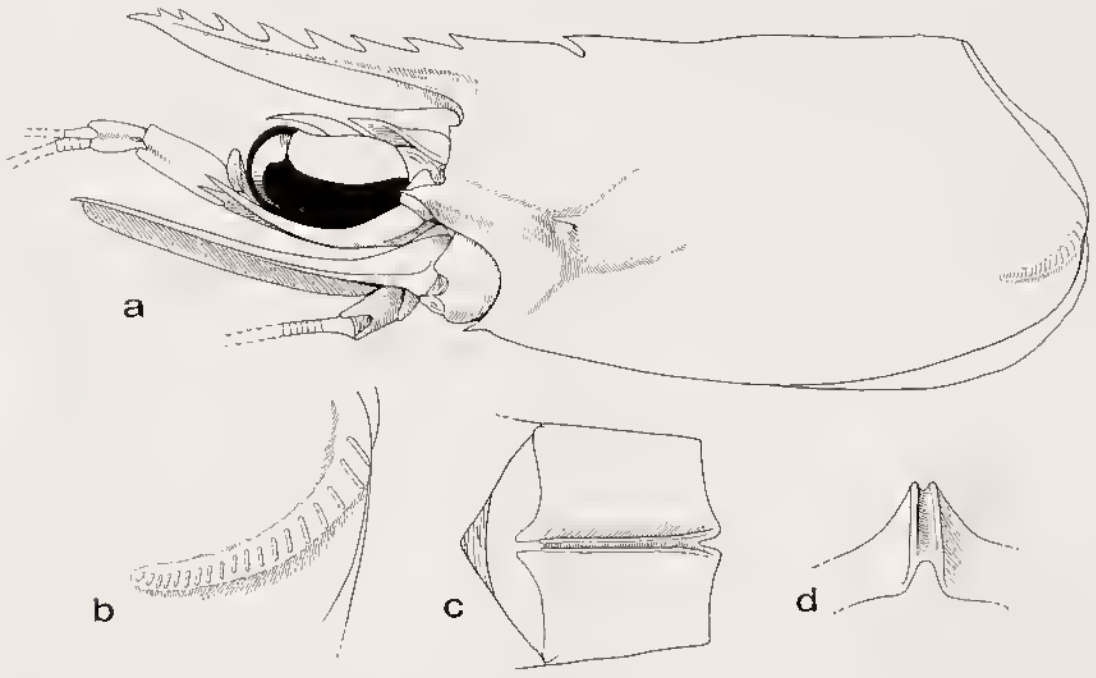

FIG. 29. — *Metapenaeopsis toloensis* Hall, 1962, ♀ 21,2 mm, Indonésie (MNHN-Na 7700) : **a**, partie antérieure du corps; **b**, appareil stridulant; **c-d**, troisième segment abdominal, vue dorsale et coupe transversale.

— le thélycum (fig. 30 a) dont la plaque thélycale est haute et relativement peu large (rapport l/L compris entre 1,25 et 1,45), avec un bord antérieur nettement sinueux (une pointe médiane encadrée par deux concavités), des bords antérolatéraux très arrondis et des bords latéraux nettement concaves. Les expansions coxales des quatrièmes péréiopodes sont bien développées et cachent partiellement la plaque thélycale et la zone intermédiaire. Cette dernière présente, dans sa partie antérieure, deux renflements en forme de virgules symétriques avec quelques longues soies, contre lesquels viennent s'insérer, du côté externe, les expansions coxales des quatrièmes péréiopodes et qui sont séparés par un sillon longitudinal marqué. Les réceptacles séminaux s'ouvrent le long des bords externes des excroissances en virgule; leurs ouvertures, en forme de fente, sont cachées par les expansions coxales des quatrièmes péréiopodes. La plaque transversale forme un bourrelet ayant la forme d'un arc peu incurvé en son milieu et avec des parties distales arrondies. Une paire de longues épines se trouve sur le sternum, entre les deuxièmes péréiopodes, et une forte excroissance transversale, divisée dans sa partie distale en deux dents à pointe mousse, entre les troisièmes.

— le pétasma (fig. 30 b-c) qui présente une valve gauche plus allongée que la droite, très massive, ayant un peu la forme d'un sabot de cheval dont la sole serait entièrement plissée par de forts replis se rejoignant presque au centre de la sole; cette valve coiffe l'élément spiralé et vient, du côté dorsal, s'appuyer contre l'élément distodorsal gauche externe. La valve droite est en forme de feuille pliée longitudinalement à angle droit (une face ventrale et une face externe), la largeur de ses deux faces diminue considérablement vers sa base et elle porte, à son sommet, quelques denticules; elle recouvre l'élément distoventral. L'élément distodorsal gauche interne a la forme d'une longue languette légèrement recourbée vers l'extérieur (fig. 30 f). L'élément distodorsal gauche externe atteint le même niveau que l'élément spiralé; il est très profondément échancré sur son tiers distal et est ainsi divisé en deux lobes (fig. 30 g-h). L'élément distoventral est très allongé; il est creusé en cuiller et assez fortement recourbé dorsalement (fig. 30 g).

COLORATION. — CHAITIAMVONG et SUPONGPAN (1992, pl. 19) ont publié une photo en couleur de cette espèce; elle n'est malheureusement guère utilisable. MOTOH et BURI (1984 : 79) mentionnent que cette espèce est rose avec des marbrures rougeâtres, les péréiopodes étant plus clairs, les pléopodes rouges ou rose pâle avec des soies blanches et les moitiés postérieures des uropodes rouges avec des soies brunes. Ces notations sont

Source : MNHN, Paris

confirmées par la bonne photo en couleur qui se trouve dans la thèse de N. LEELAPIYANART (1989, pl. 82, fig. b). MIQUEL (1984 b) indique une coloration générale brun-jaune.

TAILLE. — HOLTHUIS (1980 : 19) indique 24 mm comme longueur de la carapace chez cette espèce, ce qui correspond à une longueur totale d'un peu plus de 100 mm.

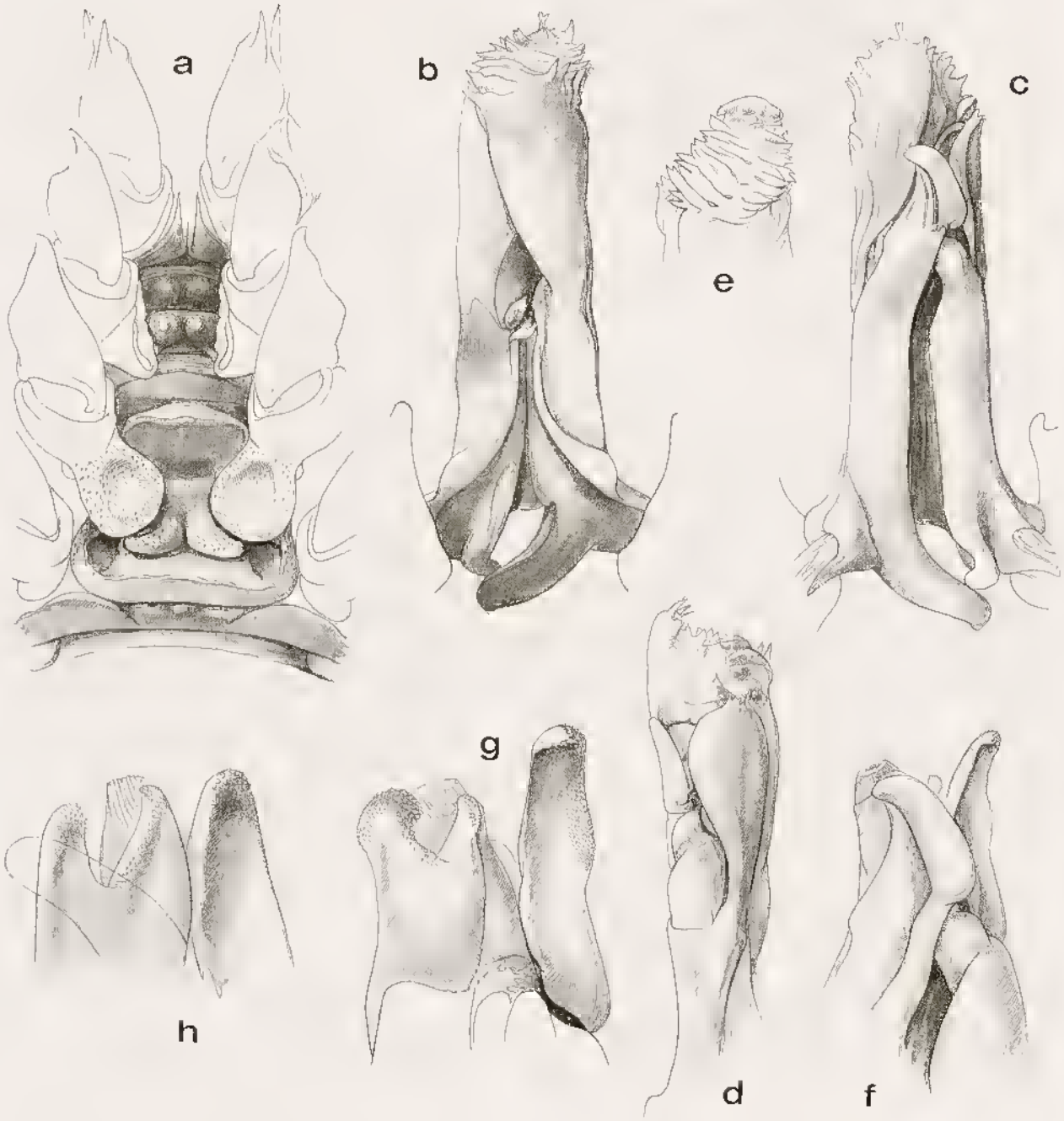

FIG. 30. — *Metapenaeopsis toloensis* Hall, 1962 : **a**, ♀ 21,2 mm, Indonésie (MNHN-Na 7700) : vue ventrale des sternites thoraciques V-VIII. — **b-g**, ♂ 14,4 mm, Australie (MNHN-Na 12820). Pétasma : **b**, vue ventrale; **c**, vue dorsale; **d**, vue latérale droite; **e**, valve gauche, vue de dessus; **f**, partie distale, vue dorsale, valves enlevées; **g**, partie distale, vue dorsolatérale droite, élément distodorsal gauche interne et valves enlevés. — **h**, ♂ 15,5 mm, golfe de Thaïlande (MNHN-Na 12826) : partie distale, vue dorsolatérale droite, élément distodorsal gauche interne et valves enlevés.

Source : MNHN, Paris

REMARQUES. — Le nombre des crêtes de l'appareil stridulant semble particulièrement élevé chez les spécimens du Sri-Lanka pour lesquels nous avons relevé les chiffres suivants : 18, 18, 19, 20, 22, 23, 24, alors que chez les spécimens des autres provenances géographiques que nous avons examinés, le nombre de crêtes le plus élevé n'a pas dépassé 20. DE BRUIN (1965 : 86) indique 16 et 23 comme limites de variations chez ses spécimens du Sri-Lanka. CHAITIAMVONG et RATANA-ANANTA (1974 : 19) indiquent 25 comme nombre maximum de crêtes en Thaïlande.

On note, par ailleurs, des différences sensibles de la forme de l'élément distodorsal gauche externe du pétasma : chez les spécimens australiens, le lobe distal externe de cet élément est nettement plus fort que le lobe interne et fortement arrondi (fig. 30 g); chez les spécimens de Thaïlande que nous avons examinés, le lobe interne serait plutôt le plus fort et le lobe externe n'est pas fortement arrondi (fig. 30 h). Les spécimens des Philippines, d'Indonésie et du Sri-Lanka se rapprochent plutôt de la forme australienne.

DISTRIBUTION. — Cette espèce est connue des Maldives, du Sri-Lanka, du Bangladesh, de la côte nord et de la partie nord de la côte est de l'Australie, de la Malaisie, du Vietnam, du nord de la mer de Chine méridionale (Guangdon et Guangxi), du Japon, des Philippines, de l'Indonésie, des îles Chesterfield et de la Nouvelle-Calédonie, entre 8 et 73 m de profondeur (la profondeur de 362 m indiquée pour l'un des échantillons de l'"*Albatross*" est certainement erronée).

Jusqu'à présent, la présence au Japon de *M. toloensis* était basée sur une présentation orale de Y. MIYA, faite lors de la réunion annuelle de la Japanese Society of Systematic Zoology, en 1982. MIYA avait alors signalé la présence de *M. toloensis* dans la baie de Shijiki (au nord-est de Kyushu). Sa communication n'a pas été publiée, à l'exception d'un "abstract", signé d'ailleurs MIYA et YOSHIDA. Par la suite K.-I. HAYASHI a mentionné la présence de *M. toloensis* au Japon, dans ses travaux de 1982 et 1992, en se basant uniquement sur la présentation orale de MIYA (K.-I. HAYASHI, comm. pers.). A la demande du Dr HAYACHI, le Dr MIYA nous a envoyé certains des spécimens qu'il a identifiés à *M. toloensis*; nous avons pu constater que ses identifications sont bien exactes.

Metapenaeopsis rosea Racek & Dall, 1965

Fig. 31-33

Metapenaeopsis rosea Racek & Dall, 1965 : 29, fig. 2D et 3, pl. 1, fig. 4, pl. 4, fig. 7 et 8, pl. 9, fig. 4. — STAROBOGATOV, 1972 : 402, pl. 9, fig. 110 a-b. — RACEK, 1973 : 155 (liste), 159 (clé). — BURUKOVSKY, 1974 : 35 (éd. 1983 : 45), fig. 44 d, 45. — MOTOH, 1977 : 6 (liste). — HOLTHUIS, 1980 : 19. — GREY, DALL & BAKER, 1983 : 76, pl. 21, 49 a, 49 b (photos coul.). — DALL & ROTHLISBERG, 1990 : 73 (clé). — DALL, 1990 : 143.

Penaeus velutinus - BATE, 1888 : 253 (en partie, 1 ♀, st. 187) (BMNH). Non Dana, 1852.

MATÉRIEL EXAMINÉ. — **Australie**. Marché de Perth, lieu de capture inconnu, A. CROSNIER coll., mars 1989 : 4 ♂ 19,2 à 20,0 mm; 5 ♀ 22,7 mm à 24,8 mm.

Côte nord : "*Challenger*" : st. 187, 10°36'S - 141°55'E, détroit de Torrès, 11 m, 9.09.1974 : 1 ♀ 17,5 mm (BMNH).

Détroit de Torrès, chalutage, 18-27 m, 29.08.1974 : 4 ♂ 17,5 à 18,8 mm; 4 ♀ 19,8 à 23,1 mm (W 15809); 1 ♂ 18,8 mm; 1 ♀ 21,0 mm (MNHN-Na 12794); 2 ♂ 18,0 et 19,6 mm; 2 ♀ 21,3 et 23,7 mm. — Archipel Dampier, île Rosemary, dragage, "*Davena*", 31.05.1960 : 2 ♂ 13,0 et 14,7 mm (WAM 193-89). — Shoal Bay : 2 ♂ 16,1 et 17,9 mm; 2 ♀ 17,8 et 19,5 mm (USNM 255633). — "*Soela*", Cr 0682, st. 130, 19°28,5'S - 118°29,9'E, 52 m, 10.12.1989 : 1 ♂ 17,5 mm; 3 ♀ 20,4 à 26,4 mm.

Côte nord-est : baie de Keppel (Middle Isl.), 9 m, 6.09.1967 : 1 ♂ 12,5 mm (VM-J 16331). — Baie de Keppel, chalutage, septembre 1970 : 1 juv. 9,5 mm; 3 ♂ 16,3, 16,5 et 17,4 mm; 2 ♀ 17,3 et 17,6 mm (VM-J 16325). — Marché de Townsville, B. RICHER DE FORGES coll., 15.06.1991 : 4 ♂ 22,1 à 24,5 mm; 4 ♀ 26,2 à 29,3 mm.

Indonésie. Sud de l'Irian Jaya, île Frederik Hendrik, D. C. ZWOLLO coll., 10.02.1955 : 1 ♀ 18,2 mm (RMNH 21402).

Cette espèce se caractérise par :

— le rostre assez haut, dont la pointe se situe entre le quart et l'extrémité du troisième article du pédoncule antennulaire et qui est droit chez les mâles, légèrement recourbé vers le haut dans sa moitié distale chez les femelles. Le rostre porte habituellement 9 dents, souvent 10, sans compter l'épigastrique.

— l'épine ptérygostomienne qui est très petite.

Source : MNHN, Paris

— l'appareil stridulant dont le nombre de crêtes est relativement très stable puisque l'on compte habituellement de 16 à 18 crêtes, exceptionnellement 15 ou 19; ces crêtes sont assez discrètes, peu longues (les postérieures l'étant toutefois nettement plus que les antérieures), également espacées les unes des autres (fig. 31 b).

— la carène dorsale du troisième segment abdominal très en relief, étroite et convexe transversalement dans sa partie antérieure, s'élargissant dans sa partie postérieure et se creusant d'un sillon profond qui s'étend jusqu'à l'extrémité postérieure de la carène. La longueur de la partie creusée d'un sillon est variable et est comprise entre les deux tiers et la moitié de la carène (fig. 31 c-d).

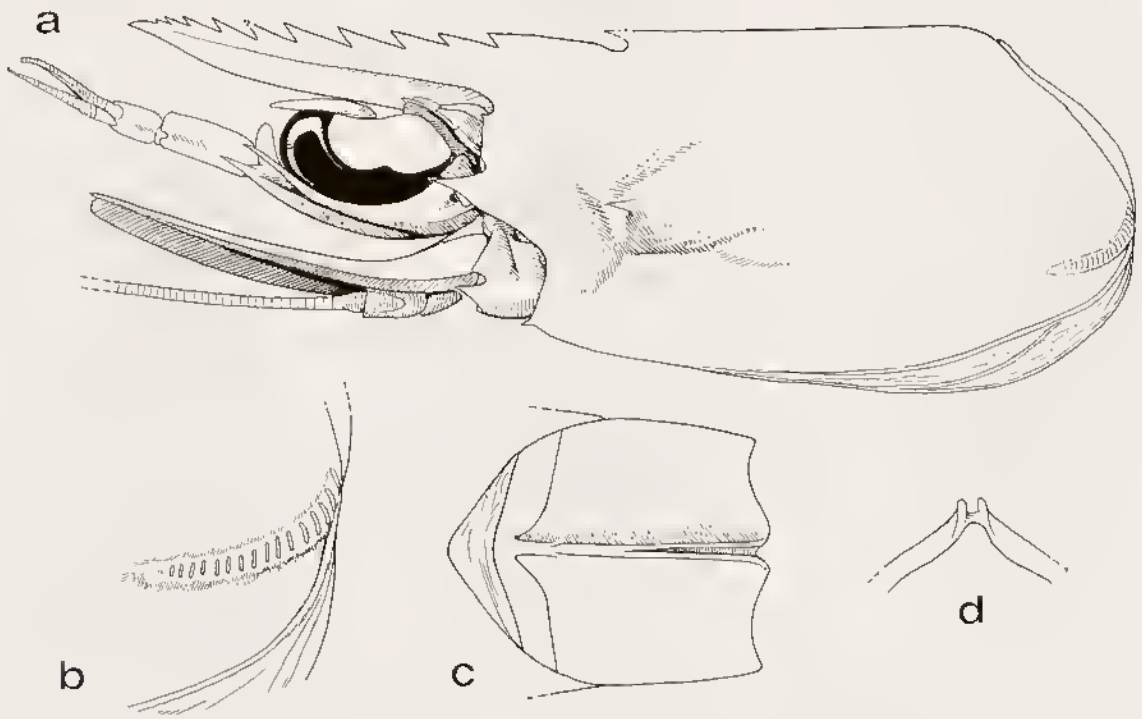

FIG. 31. — *Metapenaeopsis rosea* Racek & Dall, 1965, ♀ 21,0 mm. Australie, détroit de Torrès (MNHN-Na 12794) : **a**, partie antérieure du corps; **b**, appareil stridulant; **c-d**, troisième segment abdominal, vue dorsale et coupe transversale.

— le thélycum (fig. 32 a, 33 a) dont la plaque thélycale présente un rapport l/L qui peut varier de 1,30 à 1,60 (ce rapport semblant augmenter avec la taille des spécimens). Cette plaque est épaisse, forme un angle très ouvert avec le sternum et est ainsi, en vue ventrale, vue de trois-quarts; sa partie antérieure est très convexe et sa partie postérieure presque plane; son bord antérieur présente un denticule médian encadré par deux dépressions abondamment garnies de longues soies; ses bords antérolatéraux sont arrondis; ses bords latéraux, légèrement concaves, convergent vers l'arrière. Les expansions coxales des quatrièmes péréiopodes sont modérément développées et laissent, malgré la largeur relative de la plaque thélycale, la zone intermédiaire dégagée. Cette dernière présente un étroit sillon longitudinal et, de chaque côté de ce sillon, un fort renflement courbe, garni de soies dans sa partie supérieure; ces deux renflements sont symétriques par rapport au sillon longitudinal médian et garnissent largement la zone intermédiaire; en arrière de ces renflements, on observe un profond sillon qui borde antérieurement la plaque transversale sur toute sa longueur. Les réceptacles séminaux s'ouvrent suivant une longue fente qui borde extérieurement chaque renflement de la plaque intermédiaire; ces fentes sont cachées par les expansions coxales des quatrièmes péréiopodes. La plaque transversale forme un bourrelet pas très large, ayant la forme d'un arc dont la partie centrale est peu sinueuse et les parties distales très recourbées. Une paire de longues épines se trouve sur le sternum, entre les deuxièmes péréiopodes, et une paire de très gros tubercules, très proches l'un de l'autre, coniques à pointe mousse, entre les troisièmes.

Source : MNHN, Paris

— le pétasma (fig. 33 a-b) qui présente une valve gauche plus longue que la droite, coiffant entièrement l'élément spiralé et se terminant en sabot de cheval à sole orientée ventralement. Cette sole est bordée par des expansions lamelliformes, triangulaires, accolées les unes aux autres, à pointe légèrement recourbée vers la sole et, tout au moins chez les adultes, au nombre de 23 à 30; la face ventrale de cette valve, hors le sabot, a son bord interne qui est concave et cette face présente un maximum de largeur vers la moitié de la longueur totale de la valve. La valve droite a son bord interne très fortement convexe sauf dans sa partie basale et présente un maximum de largeur un peu au delà de la moitié de sa longueur; la partie la plus large de cette valve rentre sous la valve gauche lorsque le pétasma est fermé; cette valve se termine par une petite expansion aplatie dont le pourtour est garni par une rangée de petites digitations de taille différente, au nombre de 8 à 10. L'élément distodorsal gauche interne est en forme de languette, légèrement infléchie dorsalement et longue (elle dépasse l'élément distodorsal externe et l'élément spiralé) (fig. 32 b). L'élément distodorsal gauche externe, en vue dorsale, présente une partie distale massive, légèrement bilobée, qui rappelle un peu l'extrémité supérieure d'un tibia (fig. 32 c). L'élément distoventral est plutôt petit et, comme celui de *M. lindae*, fait penser, en vue dorsale, à un club de golf; sa partie distale se termine en pointe mousse.

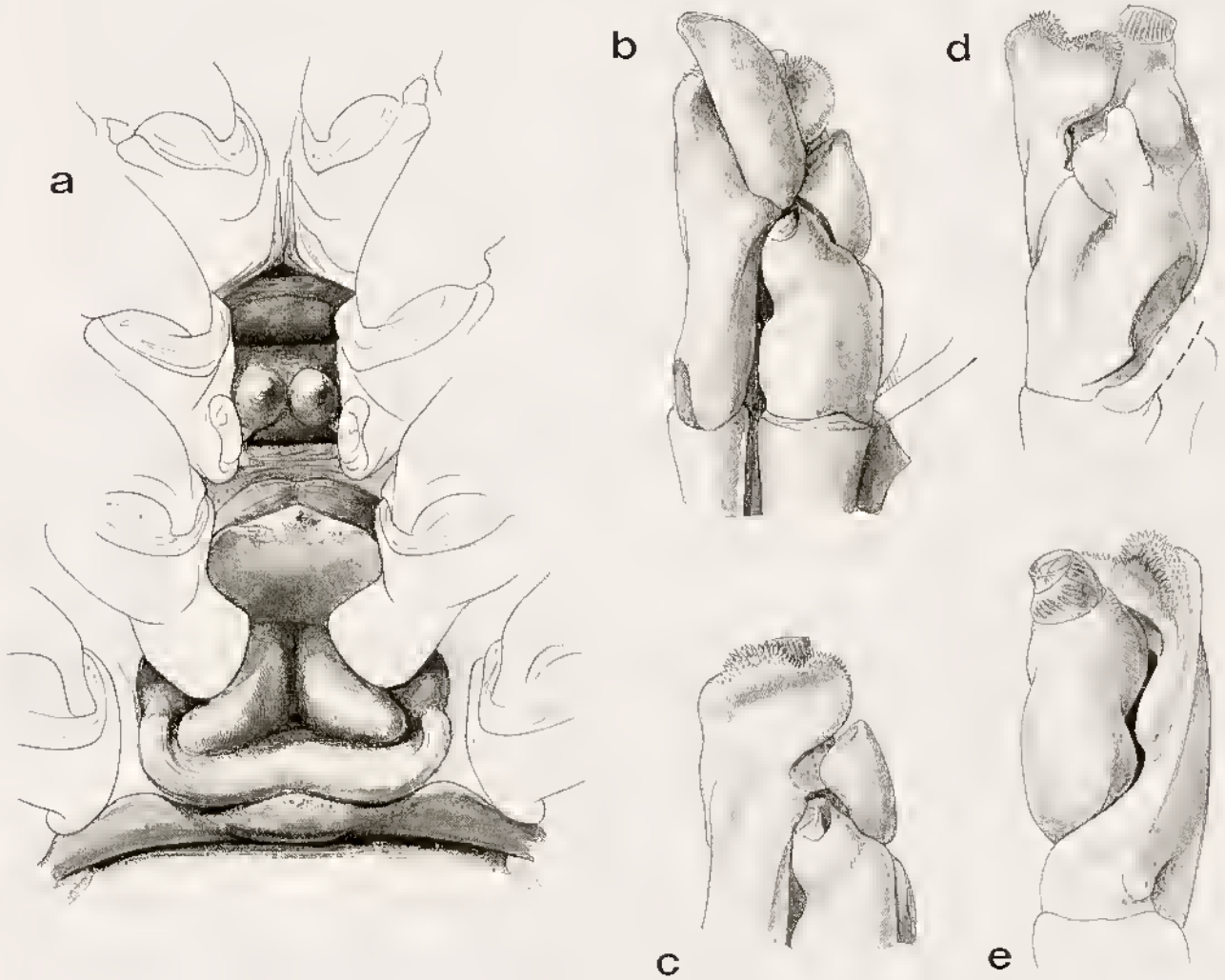

FIG. 32. — *Metapenaeopsis rosea* Racek & Dall, 1965 : **a**, ♀ 21,0 mm, Australie, détroit de Torrès (MNHN-Na 12794), vue ventrale des sternites thoraciques V-VIII — **b-e**, ♂ 18,8 mm, Australie, détroit de Torrès (MNHN-Na 12794), détails de la partie distale du pétasma : **b**, vue dorsolatérale droite, valves enlevées; **c**, vue dorsolatérale droite, valves et élément distodorsal gauche interne enlevés; **d**, vue latérale droite, valves et élément distodorsal gauche interne enlevés; **e**, vue latérale gauche, valves et élément distodorsal gauche interne enlevés.

Source : MNHN, Paris

COLORATION. — Elle varie du rose à l'orange, avec des marbrures plus foncées souvent peu marquées. Les zones branchiostèges de la carapace sont plus foncées dans leur partie centrale; il en est de même de la base des dents rostrales et des carènes abdominales.

GREY, DALL et BAKER (1983) ont publié trois excellentes photos en couleur de cette espèce.

TAILLE. — L'une de nos femelles a une longueur totale de 122 mm (Lc = 29,3 mm), ce qui semble être la taille maximale atteinte par cette espèce.

DISTRIBUTION. — Cette espèce n'est encore connue que des côtes nord et nord-est d'Australie, depuis l'archipel Dampier (117°E) jusqu'à Keppel Bay (23°S), et du sud de l'Irian Jaya, entre 7 et 52 m.

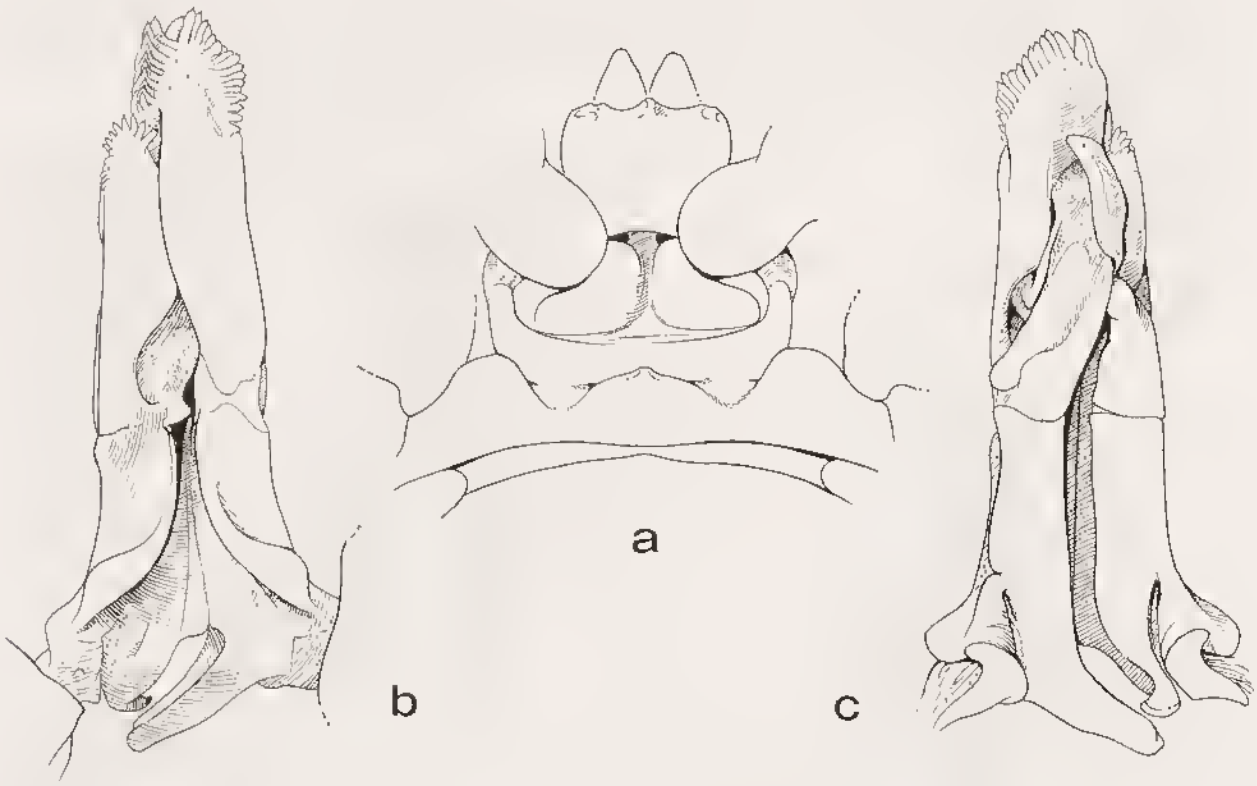

FIG. 33. — *Metapenaeopsis rosea* Racek & Dall, 1965 : a, ♀ 21,0 mm, Australie, détroit de Torrès (MNHN-Na 12794), vue des sternites thoraciques V-VIII dans le plan de la plaque thélycale. — b-c, ♂ 18,8 mm, Australie, détroit de Torrès (MNHN-Na 12794), pétasma : **b**, vue ventrale; **c**, vue dorsale.

Metapenaeopsis palmensis (Haswell, 1879)

Fig. 34, 35 a, 36

Penaeus Palmensis Haswell, 1879 : 43; 1882 : 204. — SCHMITT, 1926 : 344, pl. 61, fig. 1, 2 a, pl. 68, fig. 2 a. Non pl. 61, fig. 2 b, et pl. 68, fig. 2 b = *M. novaeguineae* (Haswell, 1879).
Penaeus velutinus - BATE, 1888 : 253 (en partie, 8 ♂ et 3 ♀ de la st. 188, 2 ♂ et 4 ♀ de la st. 190). Non Dana, 1852.
Metapenaeus palmensis - ALCOCK, 1905 : 519 (liste); 1906 : 51 (liste).
Penaeopsis palmensis - DE MAN, 1911 : 8 (liste).
Penaeopsis Palmensis - DE MAN, 1911 : 55, 73.
Penaeopsis stridulans - DE MAN, 1911 : 65 (en partie, voir remarques); 1913, pl. 7, fig. 20 a. Non Alcock, 1905.
Penaeopsis (Metapenaeopsis) novae-guineae - RACEK, 1955 : 226 (en partie, spécimens du N.S.W. seulement), pl. 4, fig. 4, pl. 7, fig. 1-2. Non Haswell, 1879.

Source : MNHN, Paris

Metapenaeopsis barbeensis Hall, 1962 : 32, fig. 118, 118 a-f. — Lee, 1972 : 271-273. — Lumubol, 1974 : 61, pl. 3, fig. 24, pl. 7, fig. 24, pl. 9, fig. 24. — Chaitiamvong & Ratana-Ananta, 1974 : 18 (clé), 19, pl. 21. — Lee & Yu, 1977 : 60, fig. 38 A-E. — Weng, 1978 : 2 (liste), 3 (clé), 19, 1 photo, 3 fig. n. n. — Naiyanetr, 1980 : 15 (liste).

Metapenaeopsis palmensis - Racek & Dall, 1965 : 23, fig. 2 B, pl. 4, fig. 3-4, pl. 9, fig. 2. — Rapson & McIntosh, 1972 : 24 (clé), 62, 83, pl. 4, fig. n. n. — Starobogatov, 1972 : 404, pl. 9, fig. 114. — Racek, 1973 : 155-157 (listes), 159 (clé). — Burukovsky, 1974 : 35 (éd., 1983 : 47), fig. 43 b. — Wear & Stirling, 1974 : 100, 103 (clé), 107 (liste). — Sakamoto & Hayashi, 1977 : 1260, 1262 (liste), 1268, fig. 2, 4. — Motoh, 1977 : 6-10 (listes); 1980 : 38, fig. 11 coul. — Holthuis, 1980 : 18. — Naamin, 1980 : 58, 60 (listes). — Lovett, 1981 : 42 (clé), fig. 82 a-e. — Miquel, 1981 a : 2 (liste); 1981 b : 5 (clé); 1981 c : 7, carte. — Toriyama & Hayashi, 1982 : 87, 103 (listes), tabl. 2-4, fig. 2, 5. — Hayashi, 1982 : 188 (clé), 191, fig. 22 c, 23 d, 24 d, 25 d, 26 d; 1986 : 63, 242, fig. coul. 22; 1992 : 81 (clé), 91, fig. 42 c, 43 d, 44 d, 45 d, 46 d. — Miyake, 1982 : 13, pl. 5, fig. 4 (photo coul.). — Grey, Dall & Baker, 1983 : 72, pl. 19 (photo coul.). — Anon., 1984 : 6, fig. coul. n. n. — Motoh & Buri, 1984 : 72, fig. 48, 49 A-F, 54 B. — Yu & Chan, 1986 : 32 (liste), 41 (clé), 146, photo coul. n. n., carte. — Said *et al.*, : 139, 144, fig. 1. — Liu, Zhong *et al.*, 1988 : 216 (clé), 226, fig. 137 1-9, 138. — Leelapiyanart, 1989 : 220 (clé), 225, pl. 54 a-c, 81 c (photo coul.). — Dall & Rothlisberg, 1990 : 73 (clé). — Dall, 1990 : 143.

Penaeus affinis - Heller, 1865 : 123. Non H. Milne Edwards, 1837.

Penaeopsis stridulans - Pesta, 1912 : 346; 1915 : 104 (en partie, spécimens du Japon, Erler, 1875, de Hongkong, "*Novara*" 1857/59, et de "? ? Sidney", "*Saida*", 1886). Non Alcock, 1905.

Penaeopsis novae-guineae - Gee, 1925 : 156. Non Haswell, 1879.

Metapenaeopsis novae-guineae - Chieung, 1960 : 64 (clé). — Hall, 1962 : 105, pl. 21, fig. 22 et 24. — Motoh, 1977 : 6 (liste). Non Haswell, 1879.

Metapenaeopsis novaeguineae - Johnson, 1979 : 5. — Toro & Moosa, 1984 a : 16; 1984 b : 15. — Naamin, 1980 : 58, 60. Non Haswell, 1879.

Matériel examiné. — **Japon.** Détroit de Kii, T. Sakamoto coll., 26.03.1979 : 2 ♂ 12,3 et 12,4 mm; 2 ♀ 13,8 et 14,1 mm. — Egawa, Shirahama, K. Sakai coll., 3.10.1988 : 3 ♀ 15,0 à 22,0 mm. — "Erler, 1876" : 1 ♀ (NMW). Identifiée *Penaeopsis stridulans* par Pesta, 1912 et 1915.

Taiwan. *Côte sud-ouest* : Tong Kong (Ping Tong County), chalutage, 10 m, T.-Y. Chan coll., 29.10.1988 : 3 ♀ 14,5 à 19,0 mm.

Hong-Kong. Novara Exped. 1857-1859 : 6 ♂ ; 1 ♀ (NMW). Identifiés *Penaeus affinis* par Heller, 1865, puis *Penaeopsis stridulans* par Pesta, 1915.

Vietnam. "*Orlik*" : golfe du Tonkin, 21°18,5'N - 107°57,4'E, 10 m, chalutage, 1.08.1960 : 2 ♂ 11,7 et 12,7 mm; 1 ♀ 13,0 mm (MMSU). — 21°03,3'N - 107°46,7'E, 13 m, chalutage, 1.08.1960 : 4 ♂ 10,9 à 12,4 mm; 1 ♀ 10,5 mm (MMSU). — 21°12,0'S - 107°50,9'E, 14 m, 1.08.1960 : 1 ♂ 11,6 mm (MMSU).

Thailande. Golfe de Thailande : 13°20,5'S - 100°37,2'E, 10 m, V. A. Spiridonov coll. : 1 ♂ 12,2 mm; 1 ♀ 9,3 mm (MMSU-Ma 3044). — Ranong Province, P. Naiyanetr coll. : 3 ♂ 13,2 à 15,1 mm; 2 ♀ 15,4 et 17,7 mm. — Pattani Province, P. Naiyanetr coll., 12.11.1982 : 1 ♀ (MNHN-Na 6912). — Songkla Province, chalutage, 20 m, P. Naiyanetr coll., 6.09. 1989 : 2 ♂ 9,6 et 11,1 mm. — Prachuap kiri Khan Province, chalutage, 20 m, P. Naiyanetr coll., 15.02.1990 : 1 ♀ 22,9 mm.

Philippines. "*Albatross*" : baie de Manille, outside breakwater, 12.12.1907 : 9 ♂ 6,1 à 9,0 mm; 8 ♀ 5,5 à 8,4 mm (USNM). — St. 5107, 14°24'30"N - 120°33'40"E, 1,75 miles au sud-est du phare de Corregidor, Luzon, 51 m, 9.01.1908 : 2 ♀ 12,7 et 14,0 mm (USNM). — St. 5182, 11°30'40"N - 123°23'20"E, 3,7 miles au nord-ouest de l'île Antonia, 44 m, 27.03.1908 : 1 ♂ 14,1 mm (USNM). — Mouillage de Tacloban, au large de Leyte, 12.04.1908 : 1 ♂ 9,5 mm (USNM). — St. 5360, 14°21'N - 120°41'E, au nord-ouest du phare de Corregidor, Leyte, 22 m, 8.02.1909 : 17 ♂ 8,5 à 12,2 mm; 43 ♀ 9,0 à 13,3 mm (USNM).

Musorstom 1 : Marché de Manille, 17.03.1976 : 2 ♂ 13,4 et 13,5 mm; 16 ♀ 14,6 à 21,6 mm (MNHN-Na 7282, en partie); 1 ♂ 14,7 mm et 1 ♀ 20,1 (MNHN-Na 12831). — St. CP 1, 14°28'N - 120°42'E, 36 m, 18.03.1976 : 22 ♂ 9,6 à 13,7 mm; 20 ♀ 13,9 à 18,9 mm.

Musorstom 3 : Marché de Manille, 27.05.1985 : 16 ♂ 12,5 à 14,4 mm; 17 ♀ 14,2 à 20,0 mm (MNHN-Na 9390). — St. CP 141, 11°44,6'N - 122°44,1'E, 40-44 m, 6.06.1985 : 12 ♂ 9,3 à 15,0 mm; 15 ♀ 9,0 à 18,5 mm.

Indonésie. "*Challenger*" : st. 188, 9°59'S - 39°42'E, 51 m, 10.09.1874 : 8 ♂ 11,0 à 15,0 mm; 3 ♀ 15,9 à 17,9 mm (BMNH). — St. 190, 8°56'S - 136°05'E, 90 m, 12.09.1874 : 2 ♂ 10,0 et 15,8 mm; 4 ♀ 6,3 à 11,2 mm (BMNH). — St. 188 ou 190 : 2 ♂ 15,0 et 16,0 mm (anciennement BMNH 1888 : 22, maintenant USNM 156426). Tous ces spécimens identifié à *Penaeus velutinus* par Bate, 1888.

"*Siboga*" : st. 2, 7°25'S - 113°16'E, détroit de Madura, 56 m, 8.03. 1899 : 1 ♂ 16,5 mm; 2 ♀ 10,8 et 16,3 mm (ZMA). — St. 19, 8°44,5'S - 116°02,5'E, baie de Labuan Tring, 18-27 m, 19-21.03.1899 : 1 ♂ 13,4 mm; 1 ♀ 12,4 mm (ZMA). — St. 33, baie de Pidjot, Lombock, 22 m, 24-26.03.1899 : 2 ♂ 9,1 et 12,0 mm; 1 ♀ 14,2 mm (ZMA). — St. 53, baie de Nangamessi, Sumba, jusqu'à 36 m, 21-22.04.1899 : 1 ♂ 12,0 mm (ZMA). — St. 205, baie de Lohio, détroit de Buton, 22 m, 20.09.1899 : 1 ♀ 8,5 mm (ZMA). — St. 213, mouillage de Saleyer, récif, 26.10-26.11.1899 : 1 ♂ 11,6 mm (ZMA).

Source : MNHN, Paris

Java, côte nord : Jepara, K. MOOSA coll. : 1 ♂ 17,1 mm; 1 ♀ 22,3 mm. — Probolinggo, K. MOOSA coll. : 3 ♂ 13,7 à 16,5 mm; 3 ♀ 17,6 à 18,9 mm.

CORINDON 2 : st. CH 205, 1°07,8'S - 117°18,7'E, 49 m, 30.10.1980 : 1 ♂ 14,7 mm.

Australie. *Côte nord* : 4 miles au nord de Jones Shoal (au large de Cobourg Peninsula), 10°53'S - 132°17'E, 12.09.1975 : 1 ♂ 13,0 mm; 1 ♀ 20,8 mm (don du NT Mus.). — Golfe de Carpentaria, 48 m, chalutage, vase et coquilles, 1.12.1990 : 1 ♂ 14,3 mm; 2 ♀ 13,7 et 22,2 mm (NTM-Cr 007894).

Côte nord-est : Cairns Inter Reef Survey, shot 6, 17°00'S - 146°21,1'E, 26.04.1982 : 2 ♂ 17,0 et 18,3 mm; 2 ♀ 19,1 et 20,0 mm.

Côte est : Sydney Harbour (Middle Harbour) : 1 ♂ 12,2 mm; 10 ♀ 15,3 à 20,5 mm (RMNH 10354).

"?? Sidney", "*Saida*", 1886 : 1 ♂; 3 ♀ (NMW). Identifiés *Penaeopsis stridulans* par PESTA, 1912 et 1915. Lieu de récolte plutôt incertain.

Cette espèce se caractérise par :

— le rostre légèrement recourbé vers le haut, dont l'extrémité se situe entre la base et les deux tiers du troisième article du pédoncule antennulaire, et qui porte 7, plus rarement 8, dents rostrales, sans compter l'épigastrique.

— l'épine ptérygostomienne petite.

— l'appareil stridulant qui comprend de 8 à 13 crêtes, presque toujours 9 ou 10. Ces crêtes sont bien espacées les unes des autres (fig. 34 b).

— la carène dorsale du troisième segment abdominal étroite dans sa partie antérieure, s'élargissant sensiblement dans sa moitié postérieure et creusée d'un sillon plus ou moins marqué sur toute sa longueur. Ce sillon peut toutefois être absent; c'est ce qui se produit chez des spécimens provenant de Sydney (RMNH 10354) chez lesquels la carène est plate et lisse.

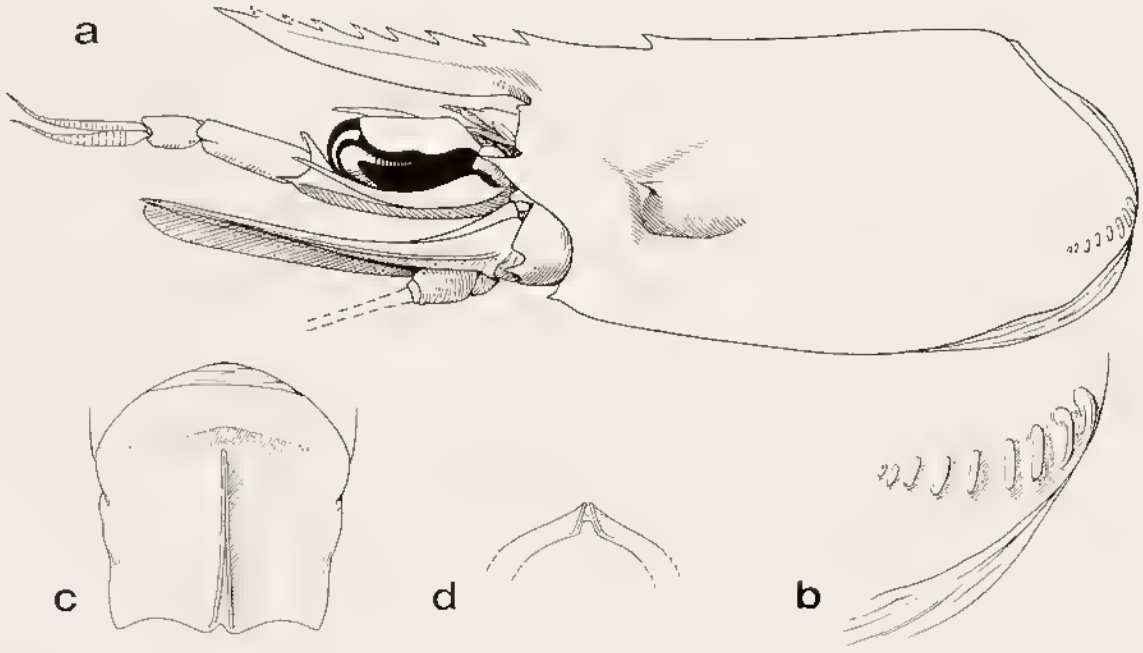

FIG. 34. — *Metapenaeopsis palmensis* (Haswell, 1879), ♀ 20,1 mm, Philippines, marché de Manille (MNHN-Na 12831) : **a**, partie antérieure du corps; **b**, appareil stridulant; **c**, troisième segment abdominal, vue dorsale et coupe transversale.

— le thélycum (fig. 35 a) dont la plaque thélycale, concave en vue ventrale, est nettement plus large que longue (rapport l/L compris entre 1,5 et 1,65) avec un bord antérieur légèrement sinueux et présentant un denticule médian souvent difficile à discerner; les bords antérolatéraux de cette plaque sont arrondis et les bords latéraux légèrement concaves et convergents vers l'arrière. Les expansions des quatrièmes péréiopodes sont modérément développées et laissent bien visible la zone intermédiaire. Cette dernière présente un sillon longitudinal médian

Source : MNHN, Paris

profond, encadré latéralement par des forts renflements triangulaires, couverts de soies, à face externe concave pour recevoir les expansions des quatrièmes péréiopodes. La plaque transversale est en forme de bourrelet large et aplati, et figure un arc avec ses parties distales régulièrement recourbées. La plaque postérieure est divisée en trois lobes dont le médian est nettement moins haut que les latéraux. Une paire de longues épines s'observe sur le sternum, entre les deuxièmes péréiopodes, et une paire de gros tubercules à sommet arrondi, entre les troisièmes.

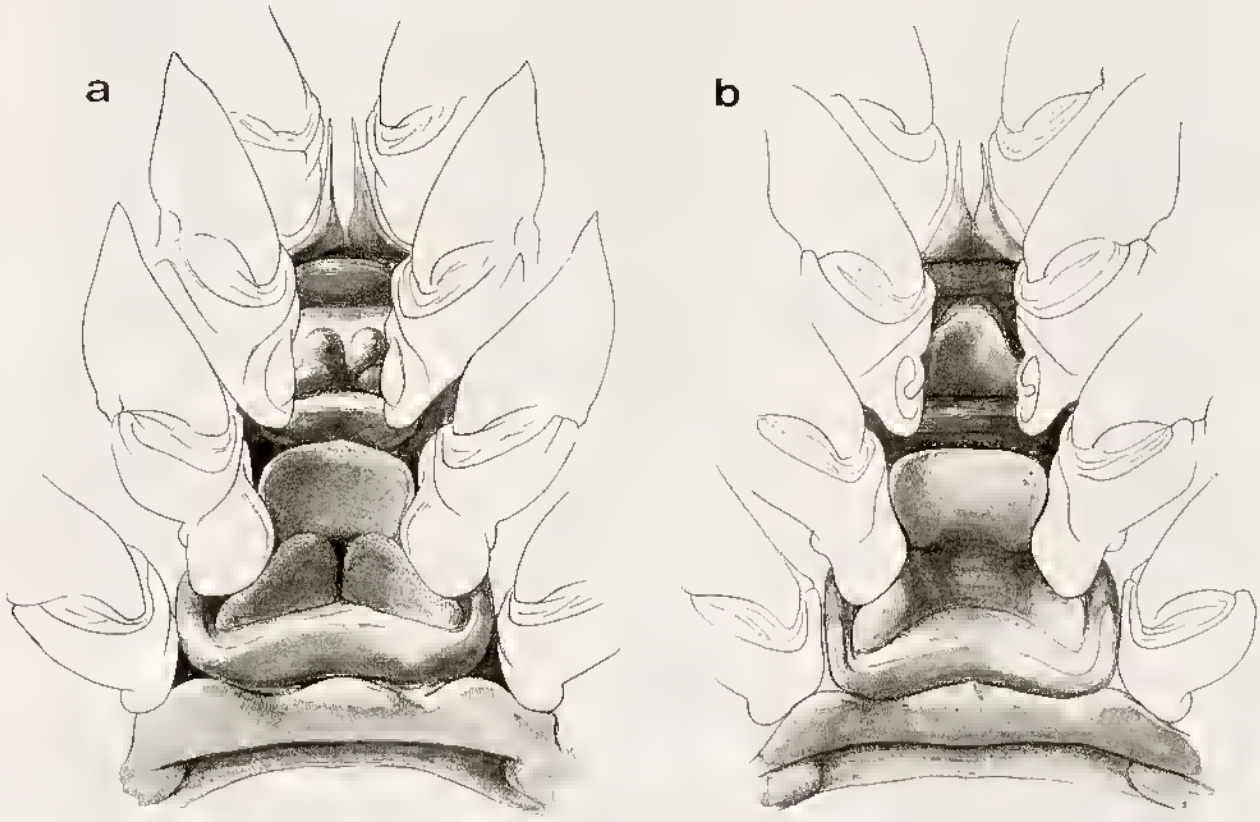

FIG. 35. — Vue ventrale des sternites thoraciques V-VIII.
a. — *Metapenaeopsis palmensis* (Haswell, 1879), ♀ 20,1 mm, Philippines, marché de Manille (MNHN-Na 12831).
b. — *Metapenaeopsis sinica* Liu & Zhong, 1988, ♀ 18,0 mm, Indonésie, CORINDON 2, st. 205 (MNHN-Na 12819).

— le pétasma (fig. 36 a-b) qui présente une valve gauche plus longue que la droite dont la partie distale, en vue ventrale, est massive, sans rétrécissement net, au contour arrondi, garnie d'une rangée transversale d'une dizaine d'expansions digitiformes courtes, parfois bifides; cette valve coiffe entièrement l'élément spiralé et vient s'appliquer étroitement contre la partie supérieure de l'élément distodorsal gauche externe. La valve droite, en vue ventrale, présente un bord antéro-externe arrondi et un angle antéro-interne qui porte, du côté dorsal, quelques petites digitations peu ou pas visibles en vue ventrale; sa face ventrale a un bord interne fortement sinueux et présente un maximum de largeur aux quatre dixièmes de sa longueur; cette partie élargie s'insère sous la valve gauche lorsque les valves sont refermées; la valve droite recouvre partiellement l'élément distoventral. L'élément distodorsal gauche interne est réduit à l'état de moignon. L'élément distodorsal gauche externe se caractérise par un fort épaulement, s'élargissant fortement vers sa base, et dont le plan est presque perpendiculaire par rapport à la face dorsale; les bords dorsal et antérieur de cet épaulement sont presque à angle droit et se rejoignent suivant une courbe régulière; l'élément distodorsal gauche externe se recourbe à son extrémité et se termine en un nodule spinuleux (fig. 36 d). L'élément distoventral, de forme vaguement triangulaire en vue ventrale, se caractérise par sa très forte expansion latérale externe à sommet arrondi (fig. 36 e, f); il s'effile à son extrémité et se termine par un nodule spinuleux comme l'élément distodorsal gauche externe. L'élément spiralé, l'élément distodorsal gauche externe et l'élément distoventral se terminent au même niveau et leurs extrémités sont contiguës (fig. 36 e).

Source : MNHN, Paris

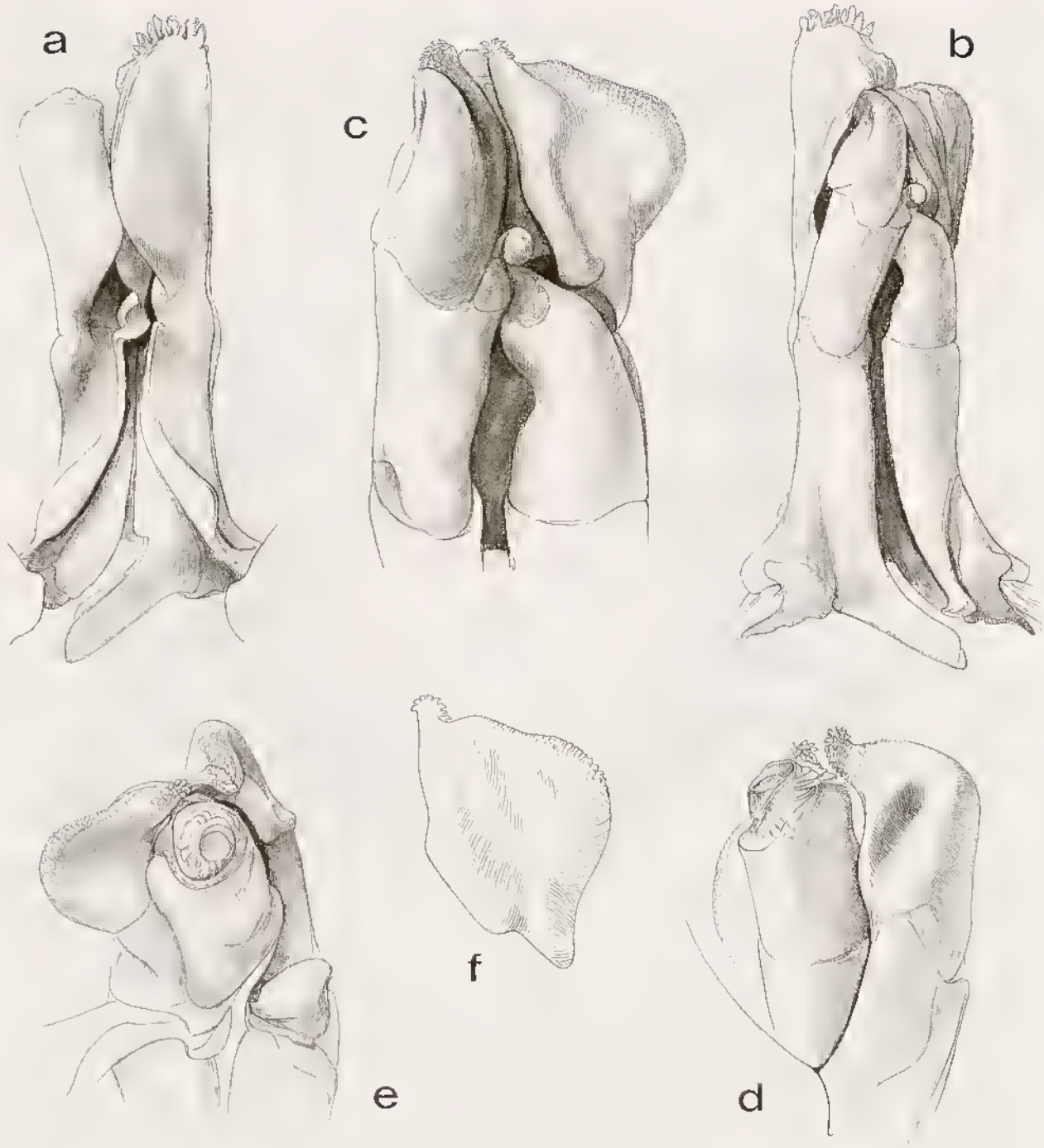

FIG. 36. — *Metapenaeopsis palmensis* (Haswell, 1879), ♀ 20,1 mm, Philippines, marché de Manille (MNHN-Na 12831). Pétasma : **a**, vue ventrale; **b**, vue dorsale; **c**, vue dorsale, valves enlevées; **d**, vue latérale gauche, valves enlevées; **e**, vue antéroventrale, valves écartées; **f**, élément distoventral, vue dorsolatérale droite.

COLORATION. — Sur un fond blanchâtre, se détachent des marbrures rose foncé à brun rouge, assez denses.

Une excellente photo en couleur de cette espèce a été publiée par GREY, DALL et BAKER (1983, pl. 19); d'autres photos en couleur se trouvent dans MIYAKE (1982, pl. 5, fig. 2), YU & CHAN (1986 : 146), HAYASHI, (1986, fig. coul. 22) et LEELAPIYANART (1989, fig. 82 c). L'aquarelle (ANON., 1984) du poster publié par le SEAFDEC paraît peu exacte.

Source : MNHN, Paris

TAILLE. — Parmi les spécimens que nous avons examinés, le plus grand est une femelle récoltée sur la côte ouest de l'Australie, dont la carapace mesure 28,4 mm et dont la longueur totale est de 120 mm. Ceci semble correspondre à la taille maximale de l'espèce.

REMARQUES. — RACEK & DALL (1965) indiquent que l'appareil stridulant peut ne compter que 6 crêtes. Cela nous paraît aberrant et ne peut concerner qu'un spécimen anormal. Par ailleurs, ces mêmes auteurs indiquent que la carène du troisième segment abdominal est "flat and narrow in anterior 1/3, widening and with distinct broad sulcus in the rest"; cette description correspond plus à la carène de *M. sinica* qu'à celle de *M. palmensis*. On peut toutefois remarquer ici que, comme cela semble être la règle chez toutes les espèces à très large répartition géographique, *M. palmensis* présente certaines variations : c'est ainsi, comme nous l'avons mentionné plus haut, que des *M. palmensis* provenant de Sydney ont la carène de leur troisième segment abdominal plate et lisse [des variations de cet ordre, rappelons le, sont observées chez *M. barbata* (de Haan, 1844)]; par ailleurs les spécimens australiens semblent se distinguer par des différences mineures du pétasma : la valve gauche est un peu plus grêle et plus longue, l'épaulement du lobe distodorsal gauche externe est un peu plus sinueux, l'expansion latérale externe du lobe disloventral est un peu moins marquée.

Comme nous l'avons signalé à propos de *M. stridulans*, plusieurs spécimens de *M. palmensis* se trouvent dans le matériel récolté par la *"Siboga"*, identifiés à tort à l'espèce d'ALCOCK par DE MAN. Ils appartiennent aux stations 2, 19, 33, 53, 179, 205, 213, 320, ainsi vraisemblablement que 258.

En ce qui concerne la référence de CHEUNG (1960), il convient de se reporter aux remarques faites à propos de *M. novaeguineae*.

DISTRIBUTION. — Elle est très large, l'espèce étant connue du Japon à la Thaïlande, la Malaisie, les Philippines, l'Indonésie, la Papouasie, l'Australie (depuis Shark Bay à l'ouest jusqu'à Sydney à l'est). Elle a été récoltée entre 5 et 90 mètres de profondeur (et même 100 d'après LIU, ZHONG *et al.*).

Metapenaeopsis parapalmensis sp. nov.

Fig. 37-38

MATÉRIAL EXAMINÉ. — **Indonésie.** *"Siboga"* : st. 64, baie de Kambaragi, Tanah Djampeah, jusqu'à 32 m de profondeur, sable coralligène et corail, 4-5.05.1899 : 2 ♂ 8,7 à 10,0 mm; 4 ♀ 8,2 à 14,5 mm (ZMA). — St. 313, mouillage est de Dangar Besar, baie de Saleh, jusqu'à 36 m de profondeur, sable, corail et vase, 14-16.02.1900 : 5 ♂ 7,0 à 7,5 mm; 5 ♀ 5,2 à 8,3 mm (ZMA).

Philippines. *"Albatross" :* st. 5159, archipel des Sulu, groupe des Tawitawi, île Tinakta, 5°11'50"N - 119°54'E, 18-22 m, 21.02.1908 : 1 ♂ 7 mm env. — St. 5181, 6,6 miles au sud-ouest de l'île San Antonia, près de Panay, 11°36'40"N - 123°26'35"E, 48 m, 27.03.1908 : 2 ♂ 8,5 et 11,0 mm; 2 ♀ 13,9 et 14,2 mm.

TYPES. — Le mâle (Lc = 11,0 mm) récolté aux Philippines, à la station 5159 de l'*"Albatross"*, est l'holotype. La femelle (Lc = 14,2 mm) et le second mâle (Lc = 8,5 mm), récoltés lors de la même station, sont respectivement l'allotype et un paratype. Les deux mâles et les quatre femelles de la station 64 de la *"Siboga"* sont des paralypes.

DESCRIPTION. — Cette espèce présente la majeure partie des caractères de *M. palmensis*. Nous donnons ci-après les caractères la différenciant :

— le nombre des crêtes de l'appareil stridulant, tout en restant dans les limites observé pour *M. palmensis*, est un peu supérieur à celui observé, chez cette espèce, pour les tailles, relativement petites, des spécimens. On relève en effet de 10 à 14 crêtes, ce qui correspond à 2 ou 3 crêtes de plus que ce qui est habituellement observé à ces tailles chez *M. palmensis* (fig. 37 b).

— la carène du troisième segment abdominal est plus large, moins creusée que ce que l'on observe habituellement chez *M. palmensis*, et ponctuée (fig. 37 c-d). Des variations sont toutefois observées et la carène de certains spécimens ne se différencie guère de celle de *M. palmensis*.

— le thélycum (fig. 38 a) présente, sur la zone intermédiaire, des renflements latéraux très bien marqués mais étroits.

Source : MNHN, Paris

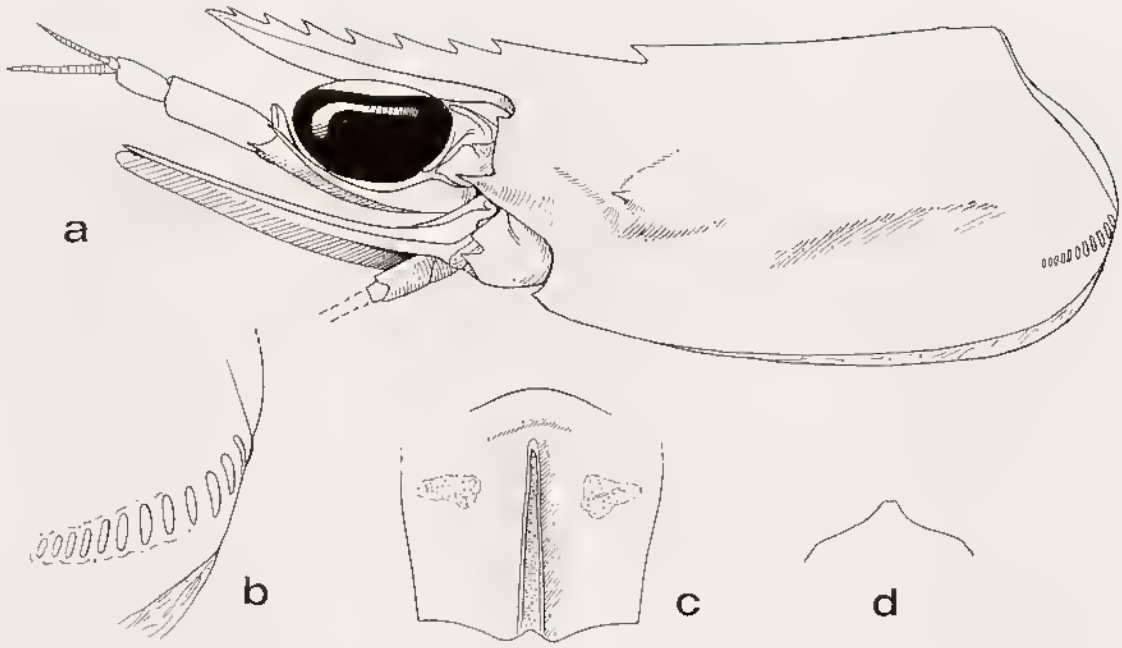

FIG. 37. — *Metapenaeopsis parapalmensis* sp. nov., ♀ allotype t4,2 mm, "*Albatross*", Philippines, st. 5181: a, partie antérieure du corps; b, appareil stridulant; c-d, troisième segment abdominal, vue dorsale et coupe transversale.

— l'élément distodorsal gauche externe du pétasma présente une partie distale bien particulière : l'épaulement dorsal est en effet très convexe distalement et séparé du petit lobe distoventral par une profonde encoche arrondie (comparez les figures 36 d et 38 b); par ailleurs le petit lobe distoventral est divisé longitudinalement en deux partie accotées : l'une dorsale qui est couverte de spinules, l'autre ventrale qui est tisse (chez *M. palmensis*, ce petit lobe est entièrement couvert de spinules); ce dernier caractère se révèle très constant (fig. 38 c). On note aussi que l'élément distoventral est un peu différent : son bord externe est moins proéminent, son bord interne est nettement plus sinueux et le petit lobe distal spinulé un peu plus allongé (comparez les figures 36 c, f et 38 d); ce caractère, contrairement au précédent, présente toutefois des variations qui font qu'il est moins utilisable comme caractère distinctif.

On notera également que l'épine branchiostège de la carapace est particulièrement petite.

ÉTYMOLOGIE. — Le terme grec *para*, près, voisin, est utilisé ici pour rappeler combien cette espèce est proche de *M. palmensis*.

REMARQUES. — En fait le seul caractère qui permet de distinguer, immédiatement, cette espèce de *M. palmensis* est la forme de l'élément distodorsal gauche externe du pétasma. L'ennui est que ce caractère ne permet de distinguer que les mâles. Pour les femelles, nous n'avons pas pu trouver de bons caractères, la forme de la carène du troisième segment abdominal, le nombre de crêtes de l'appareil stridulant et la forme des renflements de la zone intermédiaire du thélycum ne pouvant guère fournir que des présomptions, en l'absence de mâles. Pour cette raison, nous avons beaucoup hésité avant de décrire cette espèce comme nouvelle. La découverte de quatre récoltes présentant les mêmes caractéristiques particulières nous y a finalement décidé.

On remarquera que cette espèce paraît être de plus petite taille que *M. palmensis*.

Cette espèce se distingue immédiatement de *M. sinica* par la forme de sa valve gauche du pétasma, qui est semblable à celle de *M. palmensis*, et aussi par la forme de l'élément distoventral du pétasma.

DISTRIBUTION. — Connue pour l'instant des Philippines et de l'Indonésie seulement, depuis une vingtaine de mètres jusqu'à 48 m, cette espèce semble se trouver essentiellement sur des fonds de sable corallien.

Source : MNHN, Paris

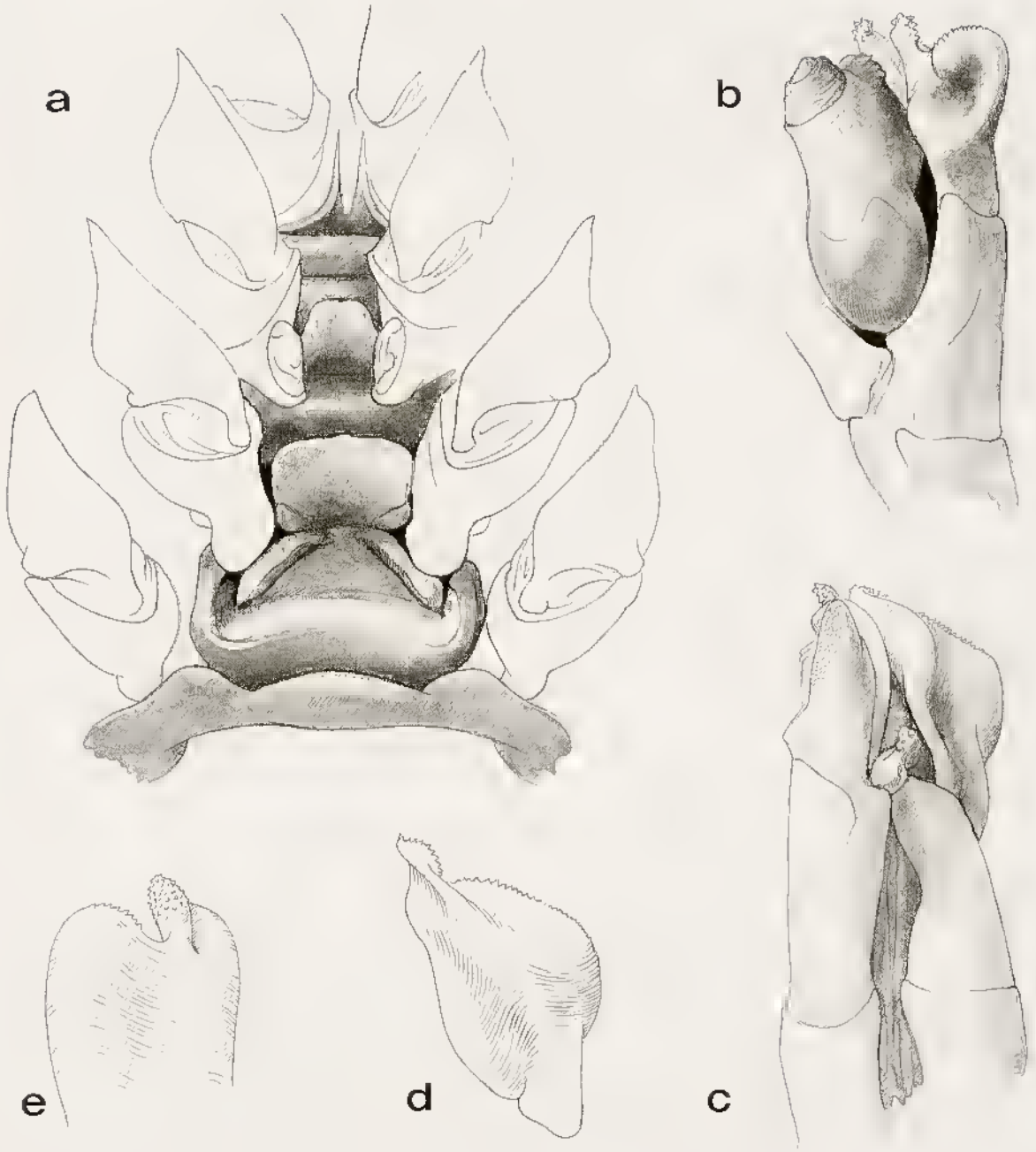

FIG. 38. — *Metapenaeopsis parapalmensis* sp. nov. : **a**, ♀ allotype 14,2 mm, *"Albatross"*, Philippines, st. 5181, vue ventrale des sternites thoraciques V-VIII. — **b-e** : ♂ holotype 11,0 mm, *"Albatross"*, Philippines, st. 5181. Pétasma : **b**, vue latérale gauche, valves enlevées; **c**, vue dorsale, valves enlevées; **d**, élément distoventral, vue dorsolatérale droite; **e**, partie distale de l'élément distodorsal gauche externe, vue dorsolatérale droite.

Metapenaeopsis sinica Liu & Zhong, 1988

Fig. 35 b, 39-41

Metapenaeopsis sinica Liu & Zhong *in* LIU, ZHONG *et al.*, 1988, 3, 224, 270, fig. 136 1-8.
Metapenaeopsis sinensis Liu & Zhong, *in* LIU, ZHONG *et al.*, 1988 : 24, 216 (clé).
Metapenaeopsis stridulans - BORRADAILE, 1910 : 257 (en partie, voir Matériel examiné ci-après). Non Alcock, 1905.

Source : MNHN, Paris

MATÉRIEL EXAMINÉ. — **Japon**. Baie de Tosa (Kochi Prefecture) : 3 ♂ 13,9 à 14,3 mm; 1 ♀ 17,2 mm (MNHN-Na 9961). — Tosa-Saga (Kochi Prefecture), 100 m, K. SAKAI coll. : 1 ♂ 11,5 mm; 1 ♀ 12,0 mm.

Chine : nord de la mer de Chine méridionale, 68 m, sable vaseux, 21.11.1959 : 2 ♂ 13,3 et 14,2 mm; 2 ♀ 14,6 et 15,0 mm (don de l'Institut d'Océanologie de Qingdao).

Taiwan. *Côte sud* : Tong Kong, chalutage, T.-Y. CHAN coll., juin 1984 : 1 ♂ 9,2 mm (NTOU).

Hong-Kong. "*Albatross*" : st. 5308, 21°54'N - 115°42'E, 113 m, 4.11.1908 : 2 ♂ 10,0 et 15,0 mm; 1 ♀ 17,0 mm (USNM). — St. 5309, 21°53'N - 115°51'E, 113 m : 2 ♂ 9,9 et 14,0 mm; 4 ♀ 10,0 à 19,1 mm (USNM 255631).

Philippines. "*Albatross*" : st. 5442, 16°30'36"N - 120°11'06"E, à 8,4 miles au nord-est du phare de la pointe San Fernando, 82 m, 10.05.1909 : 2 ♂ 10,0 et 12,1 mm; 4 ♀ 12,3 à 15,0 mm (USNM).

MUSORSTOM 1 : st. CP 45, 13°46,0'S - 120°23,8'E, 100-180 m, 24.03.1976 : 2 ♀ 16,3 et 17,4 mm. — St. 73, 14°15,0'S - 120°31,2'E, 76 m, 28.03.1976 : 4 ♂ 10,0 à 12,4 mm; 1 ♀ 14,4 mm.

Vietnam. "*Orlik*" : Golfe du Tonkin, 17°38,0'N - 107°55,0'E, 89-87 m, chalutage, 31.01.1960 : 2 ♀ 18,6 et 20,9 mm (MMSU). — 17°39,0'N - 109°42,0'E, 110 m, chalutage, 2.02.1960 : 1 ♂ 14,9 mm (MMSU). — 18°56,0'N - 107°46,0'E, 61 m, chalutage, 28.10.1960 : 1 ♂ 12,0 mm (MMSU). — 18°40,0'S - 107°50,0'E, 61 m, chalutage, 28.10.1960 : 1 ♀ 13,3 mm (MMSU).

Thaïlande. Golfe de Thaïlande, Chumphon Province, 48 m, P. NAIYANETR coll., 23.04.1990 : 2 ♂ 10,7 et 11,1 mm.

Indonésie. "*Albatross*" : st. 5642, 4°31'40"S - 122°49'42"E, au nord-ouest de la péninsule de Tikola, détroit de Buton, 68 m, 14.12.1909 : 3 ♂ 10,0 à 11,0 mm; 3 ♀ 6,5 à 13,7 mm (USNM).

CORINDON 2, Détroit de Makassar : st. 205, 1°07,8'S - 117°18,7'E, 49 m, chalutage, 30.10.1980 : 25 ♂ 7,3 à 13,0 mm; 24 ♀ 8,7 à 16,9 mm; 1 ♂ 13,0 mm et 1 ♀ 18,0 mm (MNHN-Na 12819). — St. CH 295, 1°26,5'S - 117°02,1'E, 54-51 m, 11.11.1980 : 4 ♂ 7,9 à 14,8 mm; 6 ♀ 8,5 à 17,2 mm.

Australie. *Côte nord-ouest* : 19°28,9'S - 116°29,4'E, 115 km NNW de Dampier, 110 m, vase, "*Soela*", 26.10.1983 : 6 ♂ 8,5 à 14,0 mm; 2 ♀ 15,4 et 17,9 mm (AMS-P 39947).

Nouvelle-Calédonie. LAGON. *Lagon nord* : st. 512, 19°23,8'S - 163°35,4'E, 58-59 m, 5.03.1985 : 12 ♂ 10,9 à 18,9 mm; 19 ♀ 9,0 à 24,0 mm. — St. 513, 19°19,7'S - 163°35,0'E, 55 m, 5.03.1985 : 19 ♂ 9,1 à 17,9 mm; 23 ♀ 9,3 à 23,2 mm. — St. 527, 19°22,0'S - 163°34,3'E, 58-59 m, 5.03.1985 : 27 ♂ 9,2 à 19,1 mm; 36 ♀ 9,0 à 25,4 mm. — St. 532, 19°19,6'S - 163°27,0'E, 55 m, 6.03.1985 : 1 ♀ 15,3 mm. — 19°29,5'S - 161°08,3'E, 51 m, P. LABOUTE coll., 4.12.1986 : 1 ♀ 16,1 mm.

Lagon nord-ouest : st. 1061, 20°12,4'S - 164°12,4'E, 13-17 m, 5.05.1988 : 1 ♀ 14,0 mm.

Lagon sud-ouest : st. 76, 22°24,3'S - 166°33,2'E, 40 m, vase, 20.08.1984 : 1 ♀ 19,0 mm. — St. 173, 22°08,3'S - 166°07,0'E, 20-50 m, vase grise, 18.09.1984 : 1 ♀ 10,0 mm. — St. 333, 22°36,6'S - 166°56,1'E, 71 m, vase grise, 28.11.1984 : 1 ♀ 12,7 mm.

Lagon est : st. 722, 21°23,3'S - 165°55,5'E, 42 m, 11.08.1986 : 1 ♀ 9,3 mm. — St. 833, 20°49,8'S - 165°17,7'E, 52-70 m, 11.01.1987 : 3 ♂ 13,6 à 14,4 mm; 4 ♀ 10,9 à 15,9 mm. — St. 849, 20°40,6'S - 165°10,8'E, 41 m, 11.01.1987 : 1 ♂ 7,6 mm.

Campagne Iles Belep : st. 16, 19°26,1'S - 163°42,1'E, chalutage, 16.06.1985 : 5 ♀ 13,9 à 22,6 mm. — St. 20, 19°19,5'S - 163°36,0'E, 55-58 m, 18.06.1985 : 8 ♂ 13,1 à 19,4 mm; 11 ♀ 19,5 à 22,5 mm. — St. 21, 19°21,3'S - 163°34,2'E, 58 m, 18.06.1985 : 15 ♂ 10,8 à 16,5 mm; 20 ♀ 12,8 à 22,0 mm; 1 ♀ 19,7 mm (MNHN-Na 12829). — St. 22, 19°23,3'S - 163°34,2'E, 58 m, 18.06.1985 : 5 ♂ 12,3 à 18,8 mm; 3 ♀ 19,6 à 20,9 mm. — St. 23, 19°20,7'S - 163°34,8'E, 58 m, 18.06.1985 : 1 ♂ 14,5 et 1 ♀ 21,7 mm (MNHN-Na 12822); 1 ♂ 16,5 mm; 11 ♀ 14,9 à 24,1 mm. — St. 24, 19°19,5'S - 163°29,4'E, 54-57 m, 18.06.1985 : 1 ♀ 9,4 mm. — St. 26, 19°41,8'S - 163°31,2'E, 40 m, chalutage, 19.06.1985 : 3 ♂ 13,4 et 17,0 mm; 3 ♀ 15,7 à 19,0 mm. — St. 39, 19°29,0'S - 163°25,4'E, 52-56 m, 22.06.1985 : 1 ♂ 11,3 mm; 1 ♀ 21,2 mm. — St. 42 : 19°34,0'S - 163°37,7'E, 43 m, chalutage, 22.06.1985 : 34 ♂ 9,5 à 16,5 mm.

Bangladesh, (golfe du Bengale). "*Anton Bruun*" : Cruise I, st. 44, 21°52'N - 91°36'E, 15 m, 4.04.1963 : 1 ♂ 13,8 mm. (USNM).

Birmanie (golfe du Bengale). "*Anton Bruun*" : Cruise I, st. 49, au large d'Akyab, 19°32'N - 92°52'E, 53 m, 6.04.1963 : 4 ♀ 13,7 à 19,8 mm (USNM).

Maldives. Atoll Haddummati, J. S. GARDINER coll. : 2 ♂ 11,2 et 14,7 mm (le second sans pétasma) identifiés à *M. stridulans* par BORRADAILE, 1910 (UMZC).

Golfe d'Oman. "*Anton Bruun*" : Cruise 4 B, st. 256 A, 26°10'N - 57°02'E, 55-64 m, 30.11.1963 : 4 ♀ 14,4 à 18,1 mm (USNM).

Cette espèce se caractérise par :

— le rostre légèrement recourbé vers le haut, dont l'extrémité se situe entre la base et les deux tiers du troisième article du pédoncule antennulaire, et qui porte 7, plus rarement 8, dents dorsales, sans compter l'épigastrique,

— l'épine ptérygostomienne petite.

Source : MNHN, Paris

— l'appareil stridulant qui comprend de 8 à 16 stries d'après nos nombreux relevés (LIU & ZHONG *et al.*, 1988, indiquent un nombre de crêtes compris entre 7 et 12, mais le dessin qu'ils publient en porte 13). En fait, chez les grands adultes, le nombre est habituellement compris entre 11 et 15. Ces crêtes sont bien séparées les unes des autres et celles du centre sont très nettement plus longues que celles des extrémités (fig. 39 c-d).

— la carène dorsale du troisième segment abdominal étroite, s'élargissant faiblement dans sa partie postérieure et creusée d'un sillon qui n'est habituellement très marqué que dans sa moitié postérieure (fig. 39 b, e).

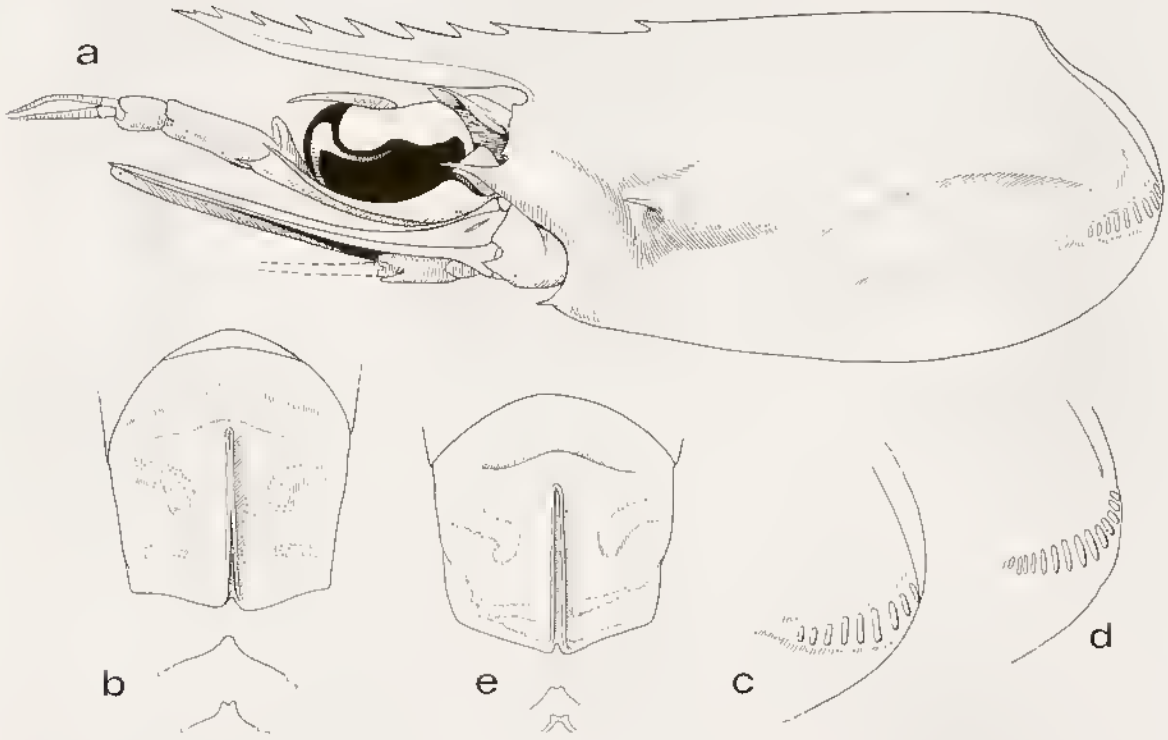

FIG. 39. — *Metapenaeopsis sinica* Liu & Zhong, 1988 : a-c : ♀ 18,0 mm, Indonésie, CORINDON 2, st. 205 (MNHN-Na 12819) : **a**, partie antérieure du corps; **b**, troisième segment abdominal, vue dorsale et coupes transversales; **c**, appareil stridulant. — **d**, ♀ 21,7 mm, Nouvelle-Calédonie, Belep, st. 23 (MNHN-Na 12822), appareil stridulant. — **e**, ♀ 19,7 mm, Nouvelle-Calédonie, Belep, st. 21 (MNHN-Na 18829), troisième segment abdominal, vue dorsale et coupes transversales.

— le thélycum (fig. 35 b) dont la plaque thélycale, en vue ventrale, apparaît concave transversalement et nettement convexe longitudinalement, avec un rapport largeur/longueur qui peut varier de 1,35 à 1,05 suivant la taille des spécimens, les plus grands présentant le rapport le plus faible; le bord antérieur de la plaque est presque droit chez les spécimens de taille moyenne, fortement concave chez les plus grands; les bords latéraux sont convexes sur toute leur longueur, la convexité étant toutefois plus marquée dans leur partie antérieure. Les expansions des quatrièmes péréiopodes sont modérément développées et laissent bien visible la zone intermédiaire. Cette dernière ne présente pas de renflements latéraux très marqués et apparaît ainsi comme une large concavité lisse (seules quelques soies existent sur ses parties latérales). Les ouvertures des réceptacles séminaux se trouvent sous les expansions coxales des quatrièmes péréiopodes. La plaque transversale est en forme de bourrelet et figure un arc avec ses parties distales fortement recourbées. La plaque postérieure est divisée en trois lobes dont le médian est nettement moins haut que les latéraux. Une paire de longues épines s'observe sur le sternum entre les deuxièmes péréiopodes et une plaque en relief couverte de soies, concave transversalement, avec des bords antérolatéraux renflés et arrondis, entre les troisièmes; chez les grands exemplaires, cette plaque développe ses angles antérolatéraux qui finissent par prendre la forme de deux gros tubercules à sommet arrondi, disposés côte à côte.

Source : MNHN, Paris

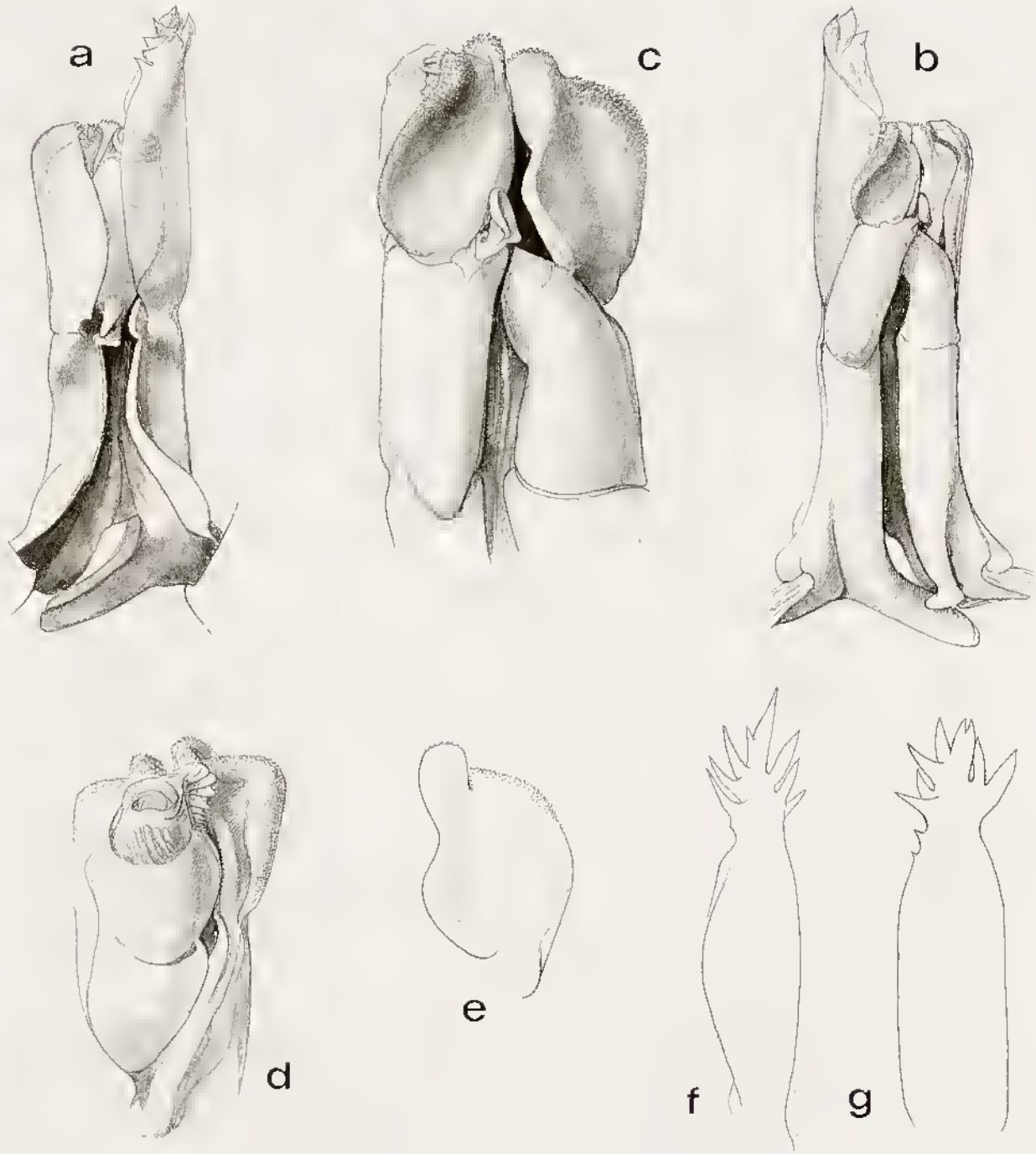

FIG. 40. — *Metapenaeopsis sinica* Liu & Zhong, 1988 : **a-c** : ♂ 13,0 mm, Indonésie, CORINDON 2, st. 205 (MNHN-Na 12819). Pétasma : **a**, vue ventrale; **b**, vue dorsale; **c**, vue dorsale, valves enlevées; **d**, vue latérale gauche, valves enlevées; **e**, élément distoventral, vue dorsolatérale droite. — **f**, ♂ 16,5 mm, Nouvelle-Calédonie, Belep, st. 23 (MNHN-Na 12822), valve gauche, vue ventrale. — **g**, ♂ 11,2 mm, îles Maldives, atoll Haddummati (UMZC), valve gauche, vue ventrale.

— le pétasma qui présente une valve gauche beaucoup plus longue que la droite, se rétrécissant dans sa partie distale et présentant soit une série de lobules triangulaires ou lancéolés (fig. 40 a-b), soit, le plus souvent, des digitations très pointues de longueur variable, parfois bifides (fig. 40 f-g); lobules et digitations sont en nombre

Source : MNHN, Paris

variable (le plus souvent de 5 à 8). Cette valve coiffe presque entièrement l'élément spiralé. La valve droite, en vue ventrale, présente un bord antéro-externe arrondi, se terminant par quelques denticules; son maximum de largeur se situe en son milieu; cette partie élargie s'insère sous la valve gauche lorsque les valves sont refermées; la valve droite recouvre partiellement le lobe distoventral. L'élément distodorsal gauche interne est très réduit, en forme de petite oreille (fig. 40 c). L'élément distodorsal gauche externe se caractérise par un fort épaulement dorsal rappelant celui observé chez *M. palmensis*, mais, ici, cet épaulement a ses bords dorsal et antérieur qui se rejoignent suivant un angle droit bien marqué (au lieu d'une courbe arrondie) et sont fortement granuleux; ce lobe se recourbe à son extrémité en un large lobule arrondi (fig. 40 c-d). L'élément distoventral est très vaguement quadrangulaire (fig. 40 e); son angle antéro-interne porte un lobule arrondi très saillant; son bord interne présente un fort renflement dans sa moitié postérieure; des spinules garnissent le lobule antéro-interne et le bord antéro-externe. L'élément spiralé, l'élément distodorsal gauche externe et l'élément distoventral se terminent très sensiblement au même niveau, et leurs extrémités sont contiguës.

COLORATION. — L'espèce est relativement très colorée, présentant des marbrures abondantes rouge brique sur un fond blanc lumineux.

TAILLE. — La plus grande femelle observée a une longueur totale de 102 mm (Lc = 25,7 mm).

REMARQUES. — Le nombre de crêtes de l'appareil stridulant varie avec la taille comme chez toutes les autres espèces; il est possible que des variations puissent s'observer en fonction des zones géographiques mais il faudrait alors avoir des échantillons couvrant mieux l'ensemble des tailles. Nos exemplaires du Japon portent de 11 à 13 crêtes, celui de Taïwan, 10 et 12, ceux de Thaïlande de 8 à 12, ceux des Philippines de 11 à 14, ceux d'Indonésie de 10 à 15, ceux d'Australie de 11 à 13 et ceux de Nouvelle-Calédonie de 9 à 16.

Cette espèce est proche de *M. palmensis* (Haswell, 1879); il est vraisemblable qu'elle a été fréquemment confondue avec elle, les deux espèces cohabitant dans de nombreuses régions.

Les mâles se distinguent très aisément par leurs pétasmas : valve gauche beaucoup plus allongée et moins massive, élément distodorsal gauche externe de même forme générale mais à relief plus tourmenté, élément distoventral à bord externe moins sinueux et à lobe distal plus arrondi.

Les femelles sont moins aisées à séparer. Le meilleur caractère distinctif est la présence, chez *M. palmensis*, d'une paire de forts renflements obliques, sétigères, sur la plaque intermédiaire, renflements absents, ou tout au moins très peu marqués, chez *M. sinica*.

Comme autres caractères séparant les deux espèces, on citera :

— l'appareil stridulant qui compte souvent, chez les adultes, plus de crêtes chez *M. sinica* (10 à 16 le plus souvent) que chez *M. palmensis* (9 ou 10 le plus souvent). Ce caractère fournit toutefois essentiellement une présomption, les limites de variation du nombre de crêtes chez les deux espèces se recoupant largement : 8 à 13 chez *M. palmensis* et 8 à 15 chez *M. sinica*.

— la carène du troisième segment abdominal qui, lorqu'elle n'a pas de sillon dans sa moitié antérieure, fournit une présomption quant à l'appartenance du spécimen à *M. sinica*.

Deux mâles, récoltés par J. S. GARDINER aux Maldives et identifiés à *M. stridulans* par BORRADAILE (1910 : 257) et un autre récolté dans le golfe du Bengale, au large du Bangladesh, par l'"*Antou Bruun*", présentent tous les caractères de *M. sinica*, à l'exception de la forme du lobe distodorsal gauche externe du pétasma. L'épaulement de ce lobe, développant un lobule arrondi, est, en effet, nettement plus haut chez ces spécimens (comparez les figures 40 d et 41 b). Il est frappant de constater que les spécimens qui présentent cette particularité sont les deux seuls mâles capturés à l'ouest de la Malaisie que nous ayons examinés. Ces mâles ont été capturés seuls, sans femelles. D'autres spécimens, identifiables à *M. sinica*, ont bien été capturés à l'ouest de la Malaisie (dans le golfe du Bengale et dans le golfe d'Oman), mais, malheureusement, ces récoltes ne renferment que des femelles. Celles-ci présentent tous les caractères de *M. sinica*, sans exception. En l'état actuel, il nous semble donc difficile de conclure. Si à l'avenir, tous les mâles capturés à l'ouest de la Malaisie présentent le pétasma particulier que nous venons de décrire, on pourra penser que, dans cette zone, *M. sinica* est représentée par une forme différente de l'espèce typique. Si les femelles de cette forme ne peuvent être distinguées de celles typiques, comme cela semble

Source : MNHN, Paris

être le cas, on ne pourra, au plus, qu'envisager la création d'une sous-espèce. On remarquera aussi que le problème qui se pose ici est à peu près identique à celui qu'ont posé *M. palmensis* et *M. parapalmensis*; nous ne lui donnons pas toutefois la même solution car, ici, la différence observée, sur deux mâles seulement, est nettement moins marquée que l'ensemble de celles observées chez *M. palmensis* et *M. parapalmensis*.

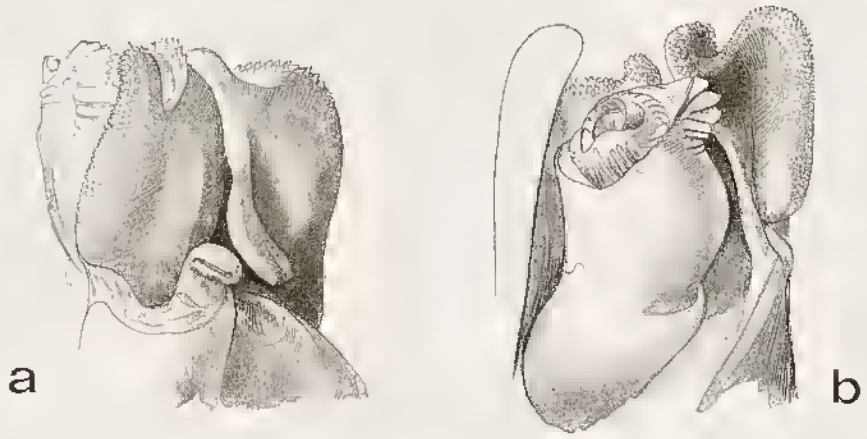

FIG. 41. — *Metapenaeopsis sinica* Liu & Zhong, 1988, ♂ 11,2 mm, îles Maldives, atoll Haddummati (UMZC). Pétasma : a, partie distale, vue ventrale, valves enlevées; b, partie distale, vue latérale gauche, valve gauche enlevée.

On mentionnera, enfin, que LIU & ZHONG appellent leur espèce, dans leur travail de 1988, tantôt *sinica*, tantôt *sinensis*. Ceci doit être dû à un changement de dénomination décidé en cours de travail et à l'oubli de corrections dans certaines parties, déjà rédigées, du travail. Le chapitre relatif à la description de l'espèce porte *sinica* qui est l'appellation à retenir, *sinensis* devenant un *nomen nudum*.

DISTRIBUTION. — Japon, mer de Chine méridionale, Taiwan, Vietnam, Thaïlande, Philippines, Indonésie, Nouvelle-Calédonie, Australie (côte nord), golfe du Bengale, Maldives, golfe d'Oman, entre 13-17 et 110 m d'après nos récoltes, entre 28 et 219 m d'après LIU et ZHONG (1988).

Metapenaeopsis aegyptia Galil & Golani, 1990

Fig. 42-45

Metapenaeus consobrinus Nobili, 1904 : 229 (en partie, mâle 7,5 mm sans pétasma, les autres spécimens étant les syntypes de *M. consobrina*); 1906 : 17 (en partie mâle ci-dessus), pl. 1, fig. 3b.
Metapenaeus stridulans - BORRADAILE, 1910 : 257 (en partie, voir Matériel examiné ci-après). Non Alcock, 1905.
Metapenaeus mogiensis - BORRADAILE, 1910 : 257 (en partie, voir Matériel examiné ci-après). Non Rathbun, 1902.
Penaeopsis stridulans - PESTA, 1915 : 104 (en partie, spécimens de la "*Pola*" en provenance de Suez et Kunfuda, mêmes spécimens que ceux mentionnés par BALSS, 1915). — BALSS, 1915 : 10. Non Alcock, 1905.
Penaeopsis (Metapenaeopsis) sp. Burkenroad, 1959 : 83, fig. 9-13.
Metapenaeopsis consobrina - STAROBOGATOV, 1972 : 374, 404, pl. 9, fig. 116. Non Nobili, 1904.
Metapenaeopsis aegyptia Galil & Golani, 1990 : 229, fig. 1 a-b, 2 a-c, 3a.
? *Penaeopsis stridulans* - TATTERSALL, 1921 : 336. Non Alcock, 1905.

MATÉRIEL EXAMINÉ — **Israël**. Côte méditerranéenne : Nizanim, B. GALIL coll., 5.11.1987 : 4 ♂ et 3 ♀ juv. — Palmahim, 50 m, B. GALIL coll., 5.11.1987 : 1 ♂ 10,0 mm; 1 ♀ 12,0 mm.

Golfe de Suez. "*Pola*" 1895-1898 : 1 ♀. Étiquetée par BURKENROAD *Penaeopsis novaeguineae* subsp. *aegyptius*.

MISSION DOLLFUS EN ÉGYPTE : st. 16, 29°28'30"N - 32°40'E, 19-33 m, sable corallien avec spongiaires, 12.12.1928 : 1 ♀ 19,4 mm (MNHN-Na 279). — St. 25, 29°49'N - 32°30'10"E, 31 m, vase molle, 12.01.1929 : 1 ♂ 9,8 mm. (MNHN-Na 280). Étiquetés par BURKENROAD *Penaeopsis (Metapenaeopsis) aegyptius*.

Source : MNHN, Paris

Mer Rouge. "*Pola*" 1895-1898 : Kunfunda, 17.01.1898 : 1 ♂ 7,4 mm. Étiqueté par BURKENROAD *Penaeopsis novaeguineae* subsp. *aegyptius*.

Golfe d'Aden. Djibouti, H. COUTIÈRE coll. : 1 ♂ 7,5 mm (identifié à une ♀ de *M. consobrina* par BORRADAILE, 1904).

Soudan. 5 ♀ 13,3 à 14,1 mm (BMNH).

Seychelles. REVES 2 : st. 42, 4°31,6'S - 56°09,7'E, 55-60 m, chalutage, sable coquillier, 13.09.1980 : 1 ♀ 17,5 mm. — St. 53, 3°48,3'S - 55°20,7'E, 60 m, chalutage, sable coquillier, 17.09.1980 : 1 ♂ 10,3 mm.

Maldives. Atoll Felidu, J. S. GARDINER coll., 1900 : 2 ♂ juv., 1 ♂ 7,3 mm; 2 ♀ juv., 2 ♀ 7,0 et 9,0 mm (UMZC). — Atoll Nilandu, J. S. GARDINER coll., 1900 : 1 ♂ 6,5 mm; 1 ♀ 6,0 mm (UMZC). — Atoll Haddumati, J. S. GARDINER coll. : 1 ♀ 10,5 mm; 2 ♀ (UMZC). Tous identifiés à *M. stridulans* ou *M. mogiensis* par BORRADAILE, 1909.

Madagascar. *Côte nord-ouest*. "*Ambariaka*" : sud de Tany Kely (près Nosy Be), 30 m, dragage, 7.06.1966 : 2 ♂ 10,0 et 12,9 mm. — 13°27'S - 48°12'E, 30 m, chalutage, 24.08.1967 : 1 ♂ 11,7 mm; 1 ♀ 14,5 mm (MNHN-Na 12824). — Ouest de Nosy Be, 50 m, dragage, 23.12.1967 : 2 ♂ 8,5 et 9,2 mm. — Nosy Iranja, 25 m, dragage, 17.09.1966 : 1 ♀ 8,4 mm. — Nosy Iranja, dragage, 20.02.1968 : 1 ♀ 9,8 mm (MNHN-Na 12825).

"*Vauban*" : Nosy Iranja, chalutage, 18.11.1969 : 5 ♀ 11,8 à 13,9 mm. — 13°13,6'S - 48°25,2'E, 32 m, chalutage, 2.08.1973 : 1 ♀ 14,4 mm. — Près de la baie des Russes, 25 m, chalutage, 6.12.1973 : 7 ♂ 9,6 à 11,5 mm. — St. CH 129, 15°25'S - 46°03,5'E, 57 m, chalutage, 19.01.1975 : 1 ♂ 9,7 mm; 5 ♀ 13,5 à 16,6 mm.

Côte ouest. "*ORSOM I*" : banc de Pracel, 55 m, juin 1959 : 9 ♂ 8,6 à 12,4 mm; 22 ♀ 7,9 à 16,0 mm. — "*F.A.O. 26*" : st. 73/III, 17°05'S - 43°50'E, 40-46 m, 26.09.1973 : 1 ♂ 9,8 mm.

Nouvelle-Calédonie. LAGON. *Lagon sud-ouest* : st. 58, 22°09,4'S - 166°12,9'E, 22 m, sable grossier coquillier, 25.05.1984 : 1 ♂ 12,4 mm. — St. 69, 22°22,8'S - 166°31,7'E, 13 m, sable coquillier, foraminifères, 20.08.1984 : 1 ♂ 7,0 mm. — St. 71, 22°19,9'S - 166°34,4'E, 22 m, sable grossier à *Heteropsammia*, 20.08.1984 : 1 ♂ 8.0 mm. — St. 85, 22°28,6'S - 166°32,4'E, 21 m, *Halimeda* et caulerpes, 21.08.1984 : 1 ♂ 8,8 mm. — St. 133, 22°24,0'S - 166°52,3'E, 59-62 m, vase, bryozoaires, 23.08.1984 : 1 ♀ abimée. — St. 234, 22°32,5'S - 166°51,1'E, 56 m, sable grossier, 23.10.1984 : 1 ♂ 10,5 mm. — St. 574 : 22°54,0'S - 167°00,0'E, 57 m, spongiaires : 1 ♂ 10,0 mm; 2 ♀ 8,2 et 13,4 mm.

Lagon nord : st. 451 *(Atoll de Surprise)*, 18°25,4'S - 163°11,3'E, 30 m, sable blanc fin, cyanophycées, 28.02.1985 : 1 ♂ 10,0 mm. — St. 1096, 19°51,4'S - 163°40,9'E, 27 m, sable grossier à *Halimeda*, *Heteropsammia*, 24.10.1989 : 1 ♂ 6,8 mm. — St. 1214, 19°49,9'S - 163°36,6'E, 29 m, sable grossier vaseux à foraminifères, *Halimeda*, 3.11.1989 : 1 ♀ 12,3 mm. — St. 1215, 19°48,0'S - 163°40,0'E, 26 m, sable grossier vaseux à foraminifères, *Halimeda*, 3.11.1989 : 1 ♀ 10,2 mm.

Lagon est : st. 601, 22°18,0'S - 167°02,5'E, 48 m, sable grossier coquillier, maerl, 5.08.1986 : 1 ♂ 8,2 mm. — St. 626, 21°57,9'E - 166°52,5'E, 48 m, sable fin vaseux à foraminifères, 6.08.1986 : 2 ♂ 5,9 et 7,9 mm. — St. 633, 21°55,6'S - 166°48,2'E, 50 m, sable à foraminifères, articles d'*Halimeda*, maerl, 6.08.1986 : 2 ♂ 5,5 et 7,5 mm; 1 ♀ 9,3 mm. — St. 675, 21°36,4'S - 166°23,9'E, 43 m, sable grossier, articles d'*Halimeda*, foraminifères, 9.08.1986 : 1 ♂ 8,0 mm. — St. 680, 21°36,4'S - 166°19,3'E, 33 m, fond dur, article d'*Halimeda*, 9.08.1986 : 2 ♂ 4,5 et 6,5 mm. — St. 683, 21°35,6'S - 166°17,5'E, 45 m, sable vaseux à turitelles, 9.08.1986 : 1 ♂ 8,2 mm. — St. 688, 21°31,4'S - 166°15,2'E, 40 m, sable grossier à foraminifères, blocs, 9.08.1986 : 2 ♀ 8,4 et 8,7 mm. — St. 701, 21°28,3'S - 166°07,1'E, 39 m, blocs et sable à foraminifères, 10.08.1986 : 1 ♂ 5,5 mm. — St. 703, 21°25,1'S - 166°06,5'E, 40 m, sable grossier vaseux, foraminifères, 10.08.1986 : 1 ♂ 5,8 mm; 1 ♀ 7,0 mm. — St. 713, 21°22,6'S - 166°00,7'E, 35 m, sable grossier, blocs, foraminifères, *Halimeda*, 11.08.1986 : 1 ♂ 8,1 mm. — St. 716, 21°22,1'S - 165°58,9'E, 30 m, sable grossier à foraminifères, caulerpes, 11.08.1986 : 1 ♀ 8,3 mm. — St. 757, 21°15,3'S - 165°45,5'E, 44 m, sable vaseux à foraminifères, blocs, *Halimeda*, 7.01.1987 : 1 ♂ 7,0 mm. — St. 761, 21°13,1'S - 165°44,3'E, 41-44 m, sable fin vaseux, 7.01.1987 : 3 ♂ 7,3 à 8,0 mm. — St. 782, 21°06,1'S - 165°36,7'E, 30 m, sable grossier, foraminifères, algues rouges, 8.01.1987 : 1 ♀ 9,3 mm. — St. 873, 20°38,5'S - 164°46,2'E, 27 m, sable grossier vaseux, 13.01.1987 : 1 ♂ 5,6 mm; 2 ♀ 5,7 et 5,8 mm. — St. 882, 20°28,8'S - 164°45,2'E, 30-40 m, sable grossier vaseux, 13.01.1987 : 1 ♂ 8,3 mm. — St. 890, 20°20,3'S - 164°35,6'E, 23 m, sable grossier à foraminifères, 14.01.1987 : 1 ♂ 9,8 mm.

Japon. Tanabe Bay, Wakayama, K. SAKAI coll., 26.10.1986 : 1 ♂ 12,8 mm (MNHN-Na 12823). — Tosa Bay, Minase, marché aux poissons, M. TORIYAMA leg., octobre 1987 : 6 ♂ 8,0 à 11,0 mm; 2 ♀ 9,4 et 10,8 mm. — *Ibidem*, M. TORIYAMA leg., juin 1988 : 1 ♂ 13,8 mm; 1 ♀ 17,5 mm.

Cette espèce se caractérise par :

— le rostre très légèrement dressé vers le haut avec une pointe qui est légèrement recourbée vers le bas et dont l'extrémité se situe un peu en deçà ou bien un peu au delà de celle du deuxième article du pédoncule antennulaire (chez de rares spécimens, l'extrémité du rostre peut toutefois atteindre la moitié du troisième article du pédoncule antennulaire). Ce rostre porte presque toujours 7 dents dorsales, rarement 6 ou 8, sans compter l'épigastrique.

— l'épine ptérygostomienne petite.

— l'appareil stridulant qui comprend de 13 à 21 crêtes régulièrement espacées et dont celles du troisième quart sont les plus grandes (fig. 42 b).

Source : MNHN, Paris

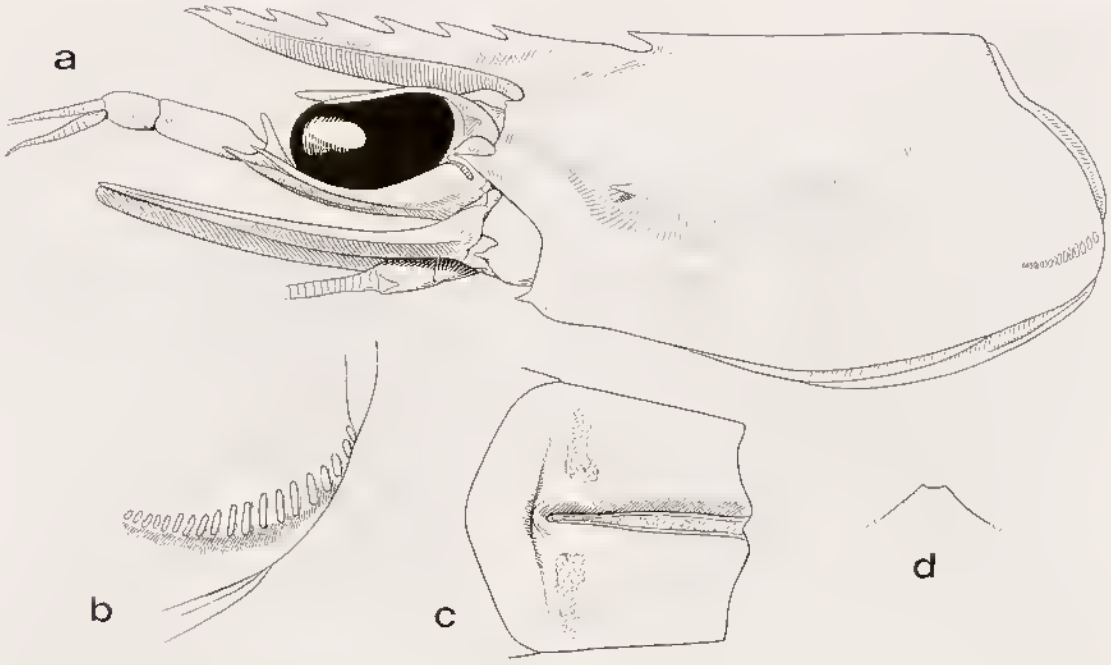

FIG. 42. — *Metapenaeopsis aegyptia* Galil & Golani, 1990 : a, ♀ 9,8 mm, Madagascar (MNHN-Na 12825), partie antérieure du corps. — **b-d**, ♀ 14,5 mm, Madagascar (MNHN-Na 12824) : b, appareil stridulant; c-d, troisième segment abdominal, vue dorsale et coupe transversale.

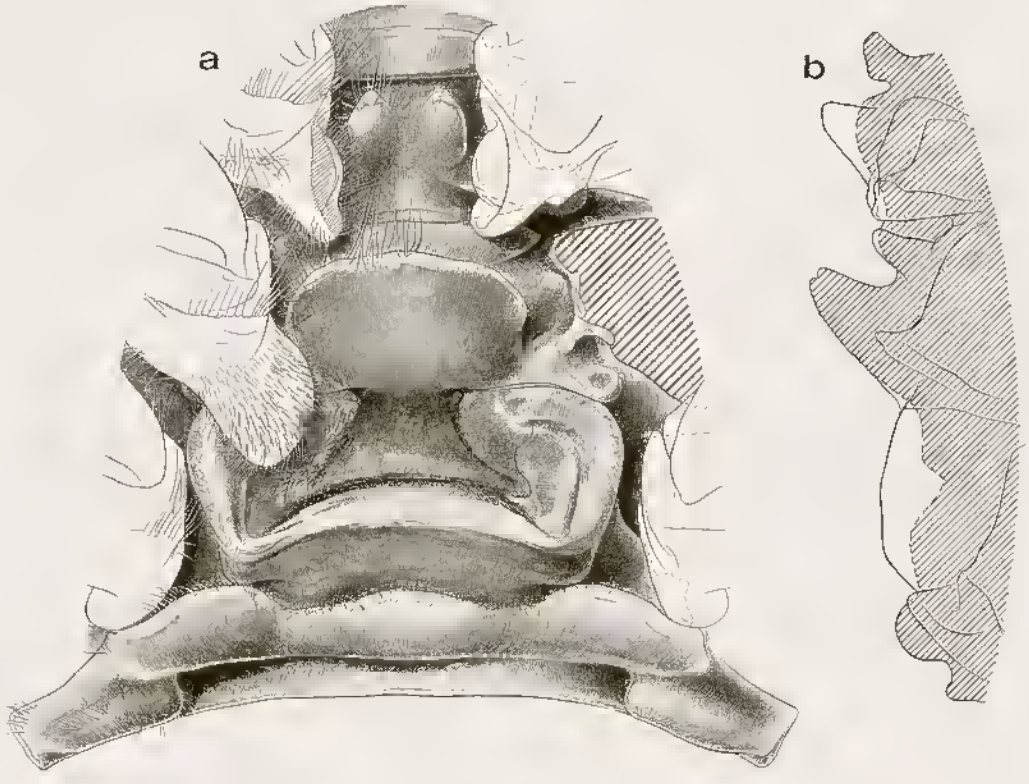

FIG. 43. — *Metapenaeopsis aegyptia* Galil & Golani, 1990, ♀ 14,5 mm, Madagascar (MNHN-Na 12824) : a, vue ventrale des sternites thoraciques V-VIII; b, coupe transversale de ces sternites.

Source : MNHN, Paris

— la carène dorsale du troisième segment abdominal plate, lisse ou ponctuée, assez large, la partie postérieure étant un peu plus large que l'antérieure (fig. 42 c-d).

— le thélycum (fig. 43) dont la plaque thélycale, en vue ventrale, est concave transversalement et convexe longitudinalement avec un rapport largeur/longueur qui peut varier de 1,40 à 1,55 suivant la taille des spécimens, les plus grands présentant les rapports les plus élevés; le bord antérieur de la plaque thélycale est droit chez les spécimens de taille moyenne, très légèrement sinueux (une partie médiane convexe, encadrée par des parties concaves) chez les plus grands; les bords antérolatéraux sont très régulièrement arrondis; les bords latéraux concaves. Les expansions des quatrièmes péréiopodes sont modérément développées et laissent bien visible la majeure partie de la zone intermédiaire. Cette dernière se présente comme une large dépression, dont les parties latérales, non cachées par les expansions coxales des quatrièmes péréiopodes, portent des soies denses; les ouvertures des réceptacles séminaux, en forme de longues fentes convexes, bordent les bords latéraux de cette zone et sont cachées par les expansions coxales des quatrièmes péréiopodes. La plaque transversale, en forme de bourrelet aplati, a sa partie centrale presque droite, tandis que ses parties latérales décrivent une large courbe, et se raccordent à la partie centrale suivant un angle assez net et légèrement ouvert. La plaque transversale postérieure est divisée en trois lobes, dont le médian est nettement moins haut que les latéraux. Une paire de longues épines s'observe, sur le sternum, entre les deuxièmes péréiopodes, et une forte excroissance divisée dans sa partie distale en une paire de gros tubercules à sommet conique, entre les troisièmes.

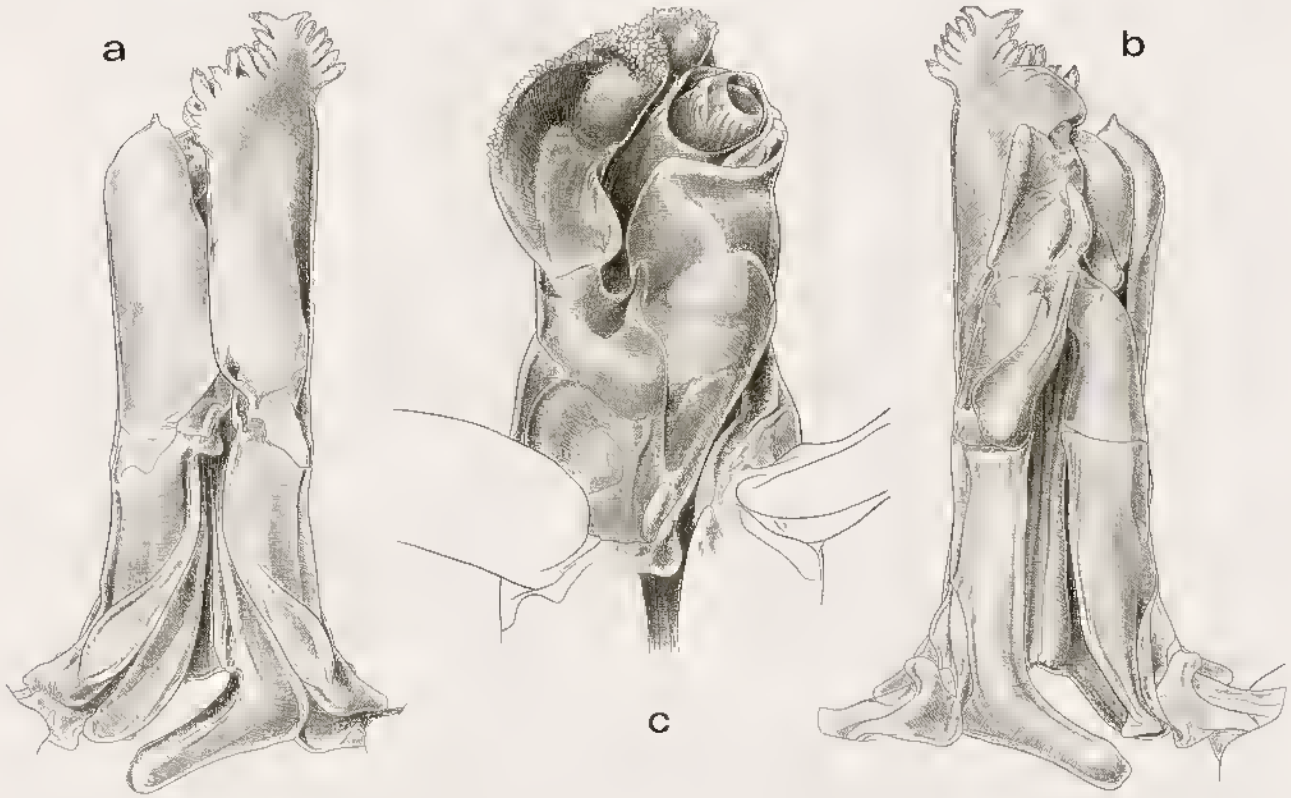

FIG. 44. — *Metapenaeopsis aegyptia* Galil & Golani, 1990, ♂ 11,7 mm. Madagascar (MNHN-Na 12824), pétasma : a, vue ventrale; b, vue dorsale; c, vue antérodorsale, valves écartées.

— le pétasma qui présente une valve gauche nettement plus longue que la droite, sans amincissement dans sa partie distale dont le bord est garni d'une rangée d'une vingtaine de lobules digitiformes, à extrémités pointues ou arrondies, serrés les uns contre les autres, simples ou bifides; cette valve coiffe l'élément spiralé et une partie du lobule distal de l'élément distodorsal gauche externe. La valve droite présente un bord antéro-externe arrondi et

Source : MNHN, Paris

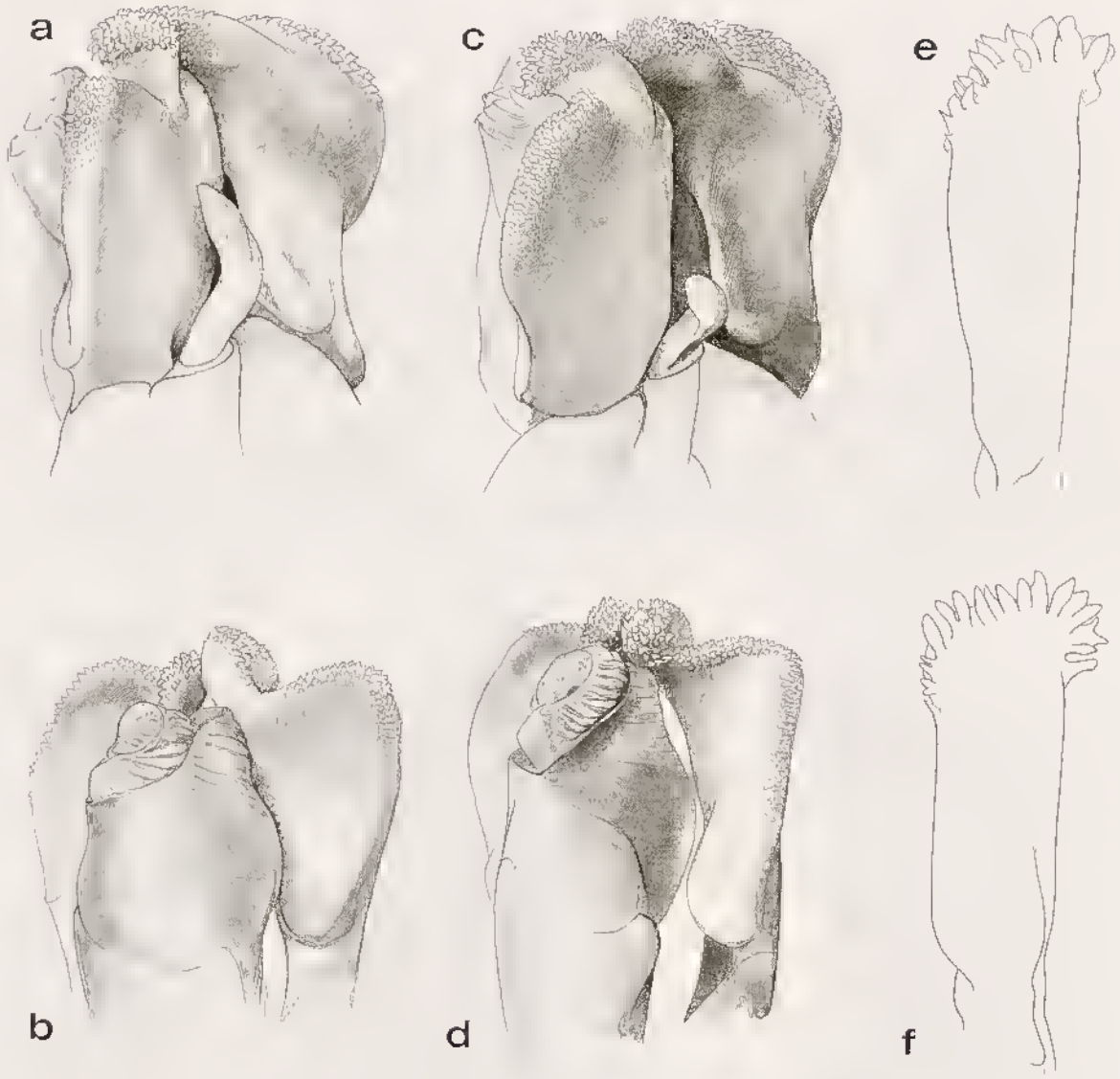

FIG. 45. — *Metapenaeopsis aegyptia* Galil & Golani, 1990. Pétasma : **a-b**, ♂ 11,7 mm, Madagascar (MNHN-Na 12824) : **a**, vue dorsale de la partie distale, valves enlevées; **b**, vue latérale gauche de la partie distale, valves enlevées. — **c-e**, ♂ 12,8 mm, Japon (MNHN-Na 12823) : **c**, vue dorsale de la partie distale, valves enlevées; **d**, vue latérale gauche de la partie distale, valves enlevées, **e**, vue ventrale de la valve gauche. — **f**, ♂ 12,4 mm, holotype, Méditerranée orientale, Israel, vue ventrale de la valve gauche (d'après GALIL & GOLANI, 1990).

porte à son extrémité de minuscules digitations en nombre variable (de 1 à 6); sa face ventrale a un bord interne fortement sinueux et présente un maximum de largeur vers son tiers basal; cette partie élargie s'insère sous la valve gauche lorsque les valves sont refermées. L'élément distodorsal interne est aplati latéralement et apparaît ainsi grêle en vue ventrale; la partie distale de sa face interne est creusée en cuillère; son développement, toujours limité, est variable, son extrémité pouvant se situer entre le quart et les deux tiers de l'élément distodorsal externe. L'élément distodorsal gauche externe se caractérise par un fort épaulement d'épaisseur assez uniforme et dont le plan est oblique par rapport à la face dorsale du pétasma; les bords dorsal et antérieur de cet épaulement se recoupent suivant un angle légèrement aigu, à sommet peu arrondi; l'élément distodorsal gauche externe se termine en un lobule spinuleux arrondi très saillant, perpendiculaire par rapport à l'épaulement. L'élément distoventral présente une grande expansion antérolatérale externe, à bord régulièrement arrondi, qui est normalement recouverte par la valve droite; son bord antérolatéral interne s'étire en un lobule, spinuleux dans sa partie distale, dont le bord antérieur

Source : MNHN, Paris

recouvre celui de l'expansion antérolatérale externe et qui vient s'appuyer contre le lobule distal de l'élément distodorsal gauche externe; son bord interne est fortement sinueux, une forte expansion à contour arrondi se trouvant dans la partie basale. Les éléments distodorsal gauche externe et distoventral se terminent au même niveau, l'élément spiralé un peu en deçà.

COLORATION. — GALIL & GOLANI (1990) la mentionne comme étant blanchâtre avec des marbrures rouge vif et des marques transversales sur le rostre.

TAILLE. — Parmi les femelles que nous avons examinées, deux, dont la carapace mesure 17,5 mm, ont une longueur totale de 82 mm. BURKENROAD (1959) mentionne une femelle de 84 mm, ce qui semble être la taille maximale connue pour cette espèce.

REMARQUES. — La présence de cette espèce d'eau peu profonde, décrite de mer Rouge, en Nouvelle-Calédonie et au Japon nous a laissé perplexe. Ceci dit, les comparaisons auxquelles nous nous sommes livré ne nous ont pas permis de découvrir des caractères pouvant séparer les diverses populations. Certes les spécimens du Japon présentent quelques différences par rapport à ceux de la mer Rouge et de l'océan Indien; en particulier l'épaulement dorsal de l'élément distodorsal gauche externe du pétasma est moins anguleux (comparez les figures 45 a et e)), l'élément distodorsal gauche interne semble toujours très court, le lobule antéro-interne de l'élément distoventral est plus fortement arrondi (comparez les figures 45 a et e). Mais toutes ces différences soit appartiennent à des caractères relativement variables chez les spécimens de la mer Rouge, soit sont si peu prononcées qu'elles ne nous semblent pas pouvoir permettre la création d'espèces distinctes, ni même de sous-espèces. Quant aux spécimens de Nouvelle-Calédonie, ils correspondent parfaitement aux spécimens de la mer Rouge.

Les jeunes femelles de cette espèce sont difficiles à distinguer de celles de *M. barbata* (même carène du troisième segment abdominal, même crêtes stridulantes), d'où parfois un problème pour les identifications en l'absence de mâles.

L'étiquetage du mâle examiné par BURKENROAD (1959) que nous avons en collection (voir liste du matériel examiné) ne correspond pas au texte de cet auteur. Notre mâle, dont la carapace mesure 9,8 mm et qui est donc bien le plus grand de ceux examinés par BURKENROAD, est accompagné d'une étiquette de la main de cet auteur indiquant qu'il a été récolté à la station 25 (golfe de Suez), alors que BURKENROAD signale la capture de mâles uniquement à la station 37 (golfe d'Akaba).

Quant au matériel identifié à *M. stridulans* par TATTERSALL, en 1921, il semble avoir disparu. Il ne se trouve ni au British Museum, à Londres, ni au Muséum de Manchester où se trouvent le plus souvent les récoltes de ce chercheur. Compte tenu de nos connaissances sur la faune de la mer Rouge, il semble très vraisemblable que le matériel de TATTERSALL ait été composé de *M. aegyptia* plutôt que de *M. stridulans*.

DISTRIBUTION. — Très large mais, sur les bases de nos connaissances actuelles avec d'étonnantes discontinuités : Méditerranée orientale (côte d'Israël), mer Rouge, Soudan, Seychelles, Madagascar, Maldives, Nouvelle-Calédonie, Japon, entre 13 et 60 m de profondeur.

ÉCOLOGIE

Il est rare que les récoltes soient accompagnées de renseignements précis sur les milieux où les captures ont été faites. Il semblerait toutefois que, contrairement aux espèces du groupe des *Metapenaeopsis* sans appareil stridulant, la plus grande partie des espèces étudiées ici vivent sur des fonds de vase ou de vase sableuse, donc dans des zones très souvent chalutables, ce qui expliquerait que certaines soient si fréquentes dans les collections.

Certaines espèces semblent toutefois faire exception. C'est notamment le cas de *M. fusca* et *M. linda* qui semblent inféodées aux fonds d'herbiers (posidonies en particulier), entrecoupés de barres sableuses et de grès. De même *M. sinuosa* et *M. parapalmensis*, qui sont les deux plus petites espèces du groupe, paraissent se trouver surtout sur les fonds de corail et de sable corallien.

Source : MNHN, Paris

DISTRIBUTION

Répartition verticale

Le tableau 1 donne une vue d'ensemble de la répartition bathymétrique des espèces considérées ici. Comme on le voit, plus de la moitié ne semblent pas dépasser 50 mètres de profondeur et la quasi totalité ne dépassent pas 100 mètres. Les quelques profondeurs relativement importantes, relevées dans la littérature, demandent à notre avis à être confirmées.

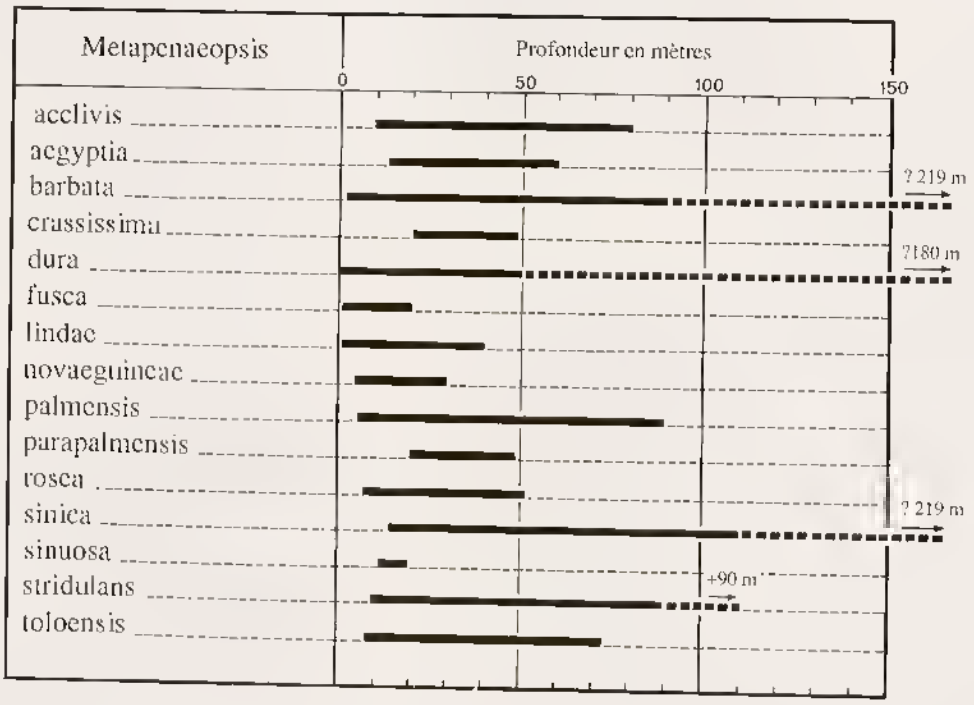

TABLEAU 1. — Répartition verticale des espèces. En trait plein, répartition certaine; en pointillé répartition relevée dans la littérature et demandant à être confirmée.

Répartition géographique

A l'exception de *M. sinuosa*, les espèces étudiées ici atteignent d'assez grandes tailles. On peut donc espérer que leur répartition géographique est assez bien connue.

L'examen du tableau 2 permet de faire un certain nombre de remarques :

— aucune *Metapenaeopsis* à appareil stridulant n'est connue des Hawaii et de la Polynésie française. Ceci peut s'expliquer, à la rigueur, dans le cas de la Polynésie française par le manque de récoltes; cette explication ne paraît pas pouvoir être mise en avant pour les Hawaii. Une autre explication serait le manque de zones vaseuses.

— en ce qui concerne la côte est d'Afrique, seule *M. barbata* a été signalée (HALL, 1966). Il s'agit presque certainement d'une erreur d'identification. Il doit plus vraisemblablement s'agir de *M. aegyptia*.

— la région qui renferme le plus d'espèces est l'Australie où 9 des 15 espèces connues ont été trouvées. Plusieurs d'entre elles (*M. crassissima*, *M. fusca*, *M. lindae*, *M. novaeguineae*, *M. rosea*, *M. sinuosa*) ne sont encore connues que de cette région (avec, dans plusieurs cas, une extension au sud de l'Irian Jaya et la Papouasie). Ceci doit correspondre à une réalité biogéographique, vraisemblablement biaisée, toutefois, par une pêche industrielle beaucoup plus organisée que dans les régions voisines et un examen des captures parfois plus attentif. En fait, dans cette région, tout se présente comme s'il existait, d'une part, un groupe d'espèces purement australiennes et, d'autre part, une arrivée, par le nord, d'espèces ayant une large répartition indo-ouest-pacifique. On peut

Source : MNHN, Paris

s'attendre, d'ailleurs, à ce que d'autres espèces soient trouvées dans le nord de l'Australie, en particulier *M. stridulans* et *M. barbata*.

— à côté d'un groupe australien, on observe un groupe japonais renfermant *M. acclivis*, *M. dura* et *M. barbata*. L'extension de ce groupe se fait vers le sud; elle est encore limitée pour *M. acclivis* et *M. dura*, plus importante pour *M. barbata* (qui curieusement semble ne pas se trouver encore aux Philippines).

— les autres espèces ayant une large répartition (*M. palmensis, M. sinica, M. toloensis, M. stridulans*) semblent plus vraisemblablement provenir de la région indomalaise d'où elles ont émigré dans toutes les directions, en ne franchissant pas, toutefois, dans le cas de *M. palmensis* et *M. sinica*, le détroit de Malacca, en s'étendant vers l'est jusqu'à la Nouvelle-Calédonie dans le cas de *M. sinica, M. toloensis* et *M. stridulans*, mais en ne dépassant pas l'Indonésie et l'Australie dans le cas de *M. palmensis*, en s'étendant au nord jusqu'au Japon dans le cas de *M. palmensis*, *M. sinica* et *M. toloensis*, mais en ne dépassant pas les Philippines dans le cas de *M. stridulans*.

— la répartition d'une espèce, *M. aegyptia*, demeure énigmatique sur la base de nos connaissances actuelles, compte tenu de ses discontinuités. Alors que cette espèce semble largement répandue dans l'océan Indien et la mer Rouge, elle disparaît vers l'est pour ne réapparaître qu'en Nouvelle-Calédonie et au Japon. Bien évidemment, un moyen de résoudre cette question serait de considérer que les spécimens de l'océan Indien, d'une part, du Japon d'autre part, et de la Nouvelle-Calédonie enfin, appartiennent à des espèces proches mais différentes. Si cela pourrait être envisagé, à la rigueur, pour les spécimens du Japon, cela ne paraît pas concevable pour les spécimens de Nouvelle-Calédonie, comme nous l'avons exposé dans le chapitre consacré à cette espèce. Il faut penser que des récoltes ultérieures permettront d'aboutir à une répartition plus cohérente.

— enfin, si l'on ne tient pas compte de l'Australie, on constate que seules 4 espèces se trouvent dans l'océan Indien, contre 12 dans l'Ouest-Pacifique.

Metapenaeopsis	Côte est d'Afrique	Madagascar	Seychelles	Mer Rouge	Golfe d'Aden, golfe Persique	Mer d'Arabie, Maldives, Sri Lanka	Golfe du Bengale	Australie	Malaisie, Thaïlande, Vietnam	Indonésie (sauf sud Irian Jaya)	Philippines	Papouasie et sud Irian Jaya	Chesterfield, Nouvelle-Calédonie	Taïwan	Japon	Hawaii	Polynésie	
acclivis													•	•				
aegyptia	?	•	•	•		•						•		•				également Méditerranée orientale
barbata							•		•	•			•	•				
crassissima								(1) •		?								(1) côtes N.W. et W.
dura									?				•	•				vers le sud, jusqu'au golfe du Tonkin
fusca								(1) •				•						(1) côte S.W., ? côte N.
lindae								•										(1) côtes S.W. et S.
novaeguineae								(1) •				•						moitié nord de l'Australie
palmensis								•	•	•	•		•	•				
parapalmensis										•	•							
rosea								(1) •				•						(1) côtes N. et N.E.
sinica								•	•	•	•	•	•	•				moitié nord de l'Australie
sinuosa								(1) •										(1) côtes N. et N.E.
stridulans				•	•	•			•	•	•		•					
toloensis					•	•	•	•	•	•			•		•			
Nombre d'espèces	1?	1	1	1	1	3	3	9	5-6	6-7	5	4	4	5	7	0	0	

TABLEAU 2. — Répartition géographique des espèces.

Source : MNHN, Paris

REMARQUES SUR LES *METAPENAEOPSIS* À APPAREIL STRIDULANT

Les espèces étudiées ici présentent un aspect général bien homogène.

En les examinant de plus près, on peut toutefois y distinguer plusieurs groupes d'espèces :

— l'un comprend *M. aegyptia*, *M. fusca*, *M. palmensis*, *M. parapalmensis*, *M. sinica*. Ces cinq espèces se caractérisent par un pétasma dont la valve gauche, peu massive, se termine par un bouquet d'expansions plus ou moins digitiformes (fig. 11 a, 35 a, 40 a, 44 a), dont l'élément distodorsal gauche interne est très rudimentaire, dont l'élément dislodorsal gauche externe présente un fort épaulement dorsal suivi d'une expansion spinulée en forme de gros tubercule ou creusée en cuiller (fig. 11 d, 36 d, 40 d, 45 a), dont l'élément distoventral se termine, du côté interne, par une expansion arrondie, précédée, du côté externe, par un très large renflement, vaguement triangulaire en vue dorsale (fig. 11 f, 36 f, 40 e, 45 a). Chez toutes ces espèces, la plaque thélycale est de largeur moyenne et les expansions coxales des quatrièmes péréiopodes laissent la zone intermédiaire du thélycum bien visible.

— un autre renferme *M. barbata*, *M. novaeguineae*, *M. stridulans*. Ces trois espèce ont un pétasma dont la valve gauche est du même type que celle du groupe précédent mais dont l'élément distodorsal gauche interne, en forme de lame quadrangulaire ou de languette allongée, est dans tous les cas bien développé (fig. 7, 14 c, 28 c), dont l'élément distodorsal gauche externe est sans épaulement dorsal (fig. 6 c, 14 d, 28 d). L'élément distoventral est, lui, de forme nettement variable suivant les espèces (fig. 6 e, 14 d, 28 d). La plaque thélycale est large ou même très large et les expansions coxales des quatrièmes péréiopodes laissent très dégagée la zone intermédiaire (fig. 6 a, 13, 27). *M. acclivis* pourrait être incorporée à ce groupe par son pétasma; elle s'en sépare, par contre, par son thélycum qui présente une plaque thélycale étroite (rapport l/L<1) et une zone intermédiaire presque complètement recouverte par les expansions coxales des quatrièmes péréiopodes (fig. 21).

— un troisième groupe est formé par les espèces dont la valve gauche du pétasma est très massive, un peu en forme de sabot de cheval (fig. 17 a, 19 b-c, 24 b-c, 30 h, 33 b-c). On y trouve *M. crassissima*, *M. dura*, *M. lindae*, *M. rosea*, *M. toloensis*. Chez ces espèces, l'élément distodorsal gauche externe du pétasma est toujours bien développé et en forme de languette (fig. 17 c, 19 e, 24 e, 30 f, 32 b). L'élément dislodorsal externe est variable : chez deux espèces, sa partie distale est découpée en deux par une très profonde échancrure (cas de *M. crassissima* et *M. toloensis*, fig. 24 e, 30 g-h), chez l'une (*M. rosea*), cette partie est seulement bilobée (fig. 32 c), chez les deux dernières (*M. dura* et *M. lindae*) la partie distale est entière (fig. 17 d, 19 e). La plaque thélycale est peu ou moyennement large, la zone intermédiaire est plus ou moins largement recouverte par les expansions coxales des cinquièmes péréiopodes.

— une espèce *M. sinuosa* (fig. 3-4) se situe à part. En fait par la gracilité de son corps, la longueur et la sinuosité de son rostre, la forme des valves, de l'élément dislodorsal gauche externe, de l'élément distoventral du pétasma, cette espèce rappelle les *Metapenaeopsis* d'eau profonde du groupe *philippii*. Mais par la présence d'un appareil stridulant, la forme de son thélycum, la présence d'un élément distodorsal gauche interne sur le pélasma, elle se rattache aux espèces étudiées dans ce travail.

Comme nous l'avons signalé dans le cours de notre travail, les espèces ayant une large répartition montrent souvent des variations morphologiques, faibles, suivant les zones géographiques. C'est le cas notamment pour *M. barbata*, *M. stridulans*, *M. aegyptia*. Les variations portent sur la carène du troisième segment abdominal, le nombre des crêtes de l'appareil stridulant et aussi sur la forme de certains éléments du pétasma.

L'étude des *Metapenaeopsis* à appareil stridulant n'a progressé que lentement. En 1905 seules quatre espèces étaient décrites; en 1950, cinq; en 1965, juste avant la révision des crevettes pénéides d'Australie de RACEK & DALL, huit espèces étaient connues; par la suite deux étaient décrites en 1965, trois en 1988, une en 1990 et une maintenant, portant ainsi le nombre à 15.

A la suite de nos trois publications sur les *Metapenaeopsis* indo-ouest-pacifiques, on compte dans ce genre 46 espèces et sous-espèces sans appareil stridulant, auxquelles il convient d'en ajouter deux décrites dans l'article suivant de ce volume (CROSNIER, 1994) et 15 espèces avec un appareil stridulant.

Source : MNHN, Paris

Dans l'Est-Atlantique, une seule espèce, *M. miersi* (Holthuis, 1952), espèce type du genre, est commune. *M. gerardoi* Pérez Farfante, 1971, espèce répandue dans l'Ouest-Atlantique, a été trouvée à l'île Sainte Hélène (voir CROSNIER, 1990).

Dans l'Ouest-Atlantique, 5 espèces ont été reconnues : *M. gerardoi* Pérez Farfante, 1971, *M. goodei* (Smith, 1885), *M. hobbsi* Pérez Farfante, 1971, *M. martinella* Pérez Farfante, 1971, *M. smithi* (Schmitt, 1924).

Dans l'Est-Pacifique, 4 espèces existent : *M. beebei* (Burkenroad, 1938), *M. kishinouyei* (Rathbun, 1902), *M. mineri* Burkenroad, 1934, *M. stockmani* Burukovsky, 1990.

Cela donne un total de 73 espèces et sous-espèces de *Metapenaeopsis* parmi lesquels, comme BURKENROAD (1934) l'a fait remarquer le premier, deux grands groupes se distinguent :

— l'un regroupe les espèces atlantiques et est-pacifiques, plus une espèce (*M. commensalis* Borradaile, 1898) indo-ouest-pacifique. Ces espèces se caractérisent par un pétasma dont seule la valve droite est développée. Ce groupe compte 11 espèces (en supposant que *M. stockmani* doit être classée dans ce groupe, ce qui est probable mais non certain, le pétasma du mâle de cette espèce n'étant pas connu).

— l'autre regroupe toutes les autres espèces indo-ouest-pacifiques qui se caractérisent par un pétasma dont les deux valves sont développées.

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Source : MNHN, Paris

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INDEX

Nous ne donnons ici qu'un index très simplifié dans lequel on trouvera uniquement les noms des espèces étudiées, sans leurs variations orthographiques, et les noms des espèces considérées comme synonymes.

Ces derniers sont en italiques, tandis que les noms des espèces nouvelles sont en gras.

Pour chaque espèce, l'indication de page renvoie au chapitre où est traitée cette espèce, à l'exclusion des autres chapitres dans lesquels cette espèce peut être citée et des pages correspondant à des figures.

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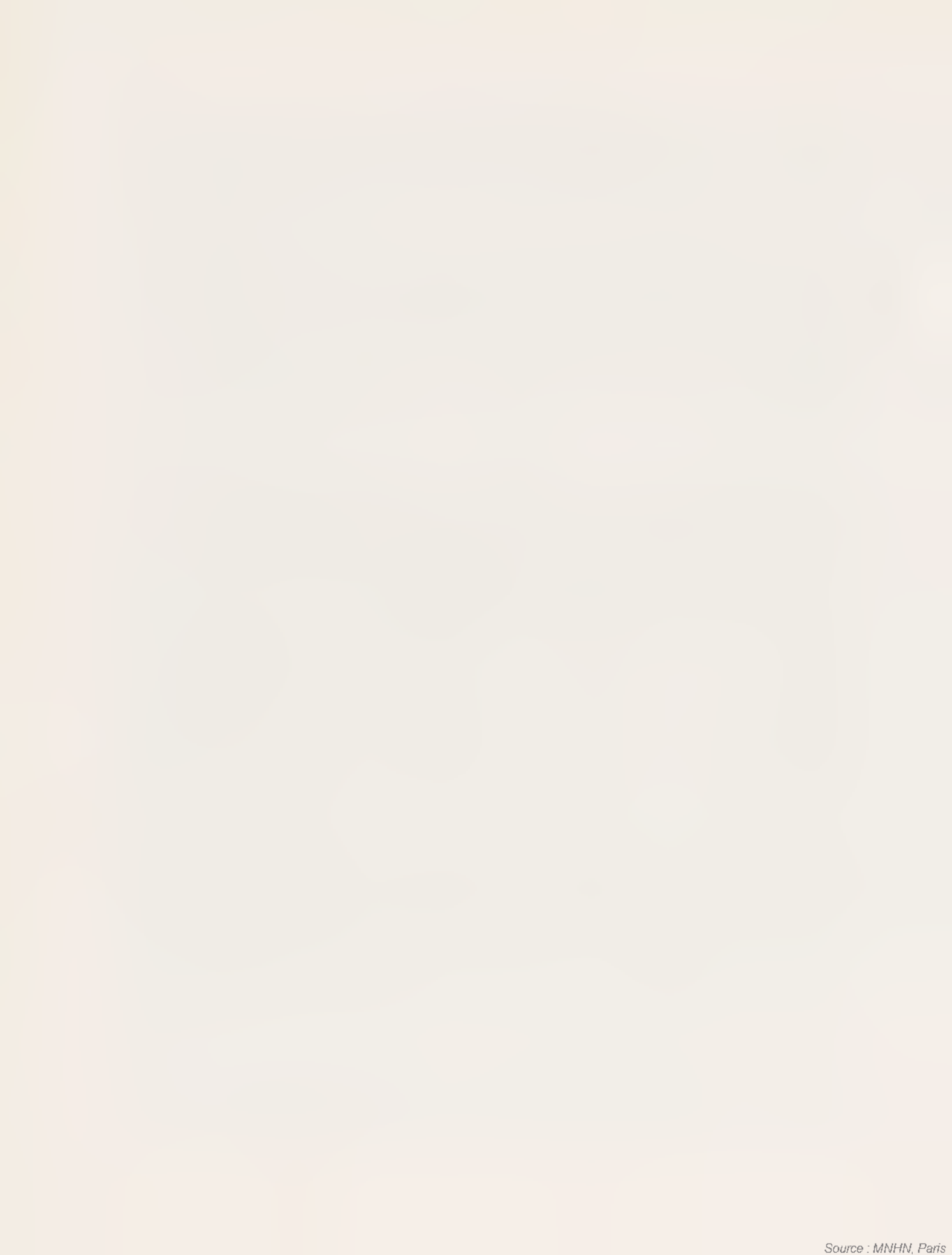

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8

Crustacea Decapoda : Observations complémentaires sur les *Metapenaeopsis* indo-ouest-pacifiques sans appareil stridulant (Penaeidae) Description de deux espèces nouvelles

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RÉSUMÉ

Des observations complémentaires sur huit espèces de *Metapenaeopsis* indo-ouest-pacifiques sans appareil stridulant, faites depuis nos travaux parus en 1987 et 1991, sont publiées. Deux espèces nouvelles sont, par ailleurs, décrites.

ABSTRACT

Crustacea Decapoda : Complementary observations on the Indo-West Pacific species of *Metapenaeopsis* without stridulating organs (Penaeidae) with descriptions of two new species.

Complementary observations on eight Indo-West Paeific speeies of *Metapenaeopsis* without stridulating organs are given and two new species are described.

Depuis que nous avons rédigé nos deux travaux traitant des *Metapenaeopsis* sans appareil stridulant (CROSNIER, 1987, 1991), nous avons fait quelques observations complémentaires sur certaines des espèces de ce groupe que nous livrons ici. Par ailleurs, un nouvel examen des collections du National Museum of Natural History, à Washington, et celui de collections faites par le Dr B. G. IVANOV dans l'océan Indien et qui nous ont été confiées par le Dr V. A. SPIRIDONOV de l'Université de Moscou, ont permis de découvrir deux espèces nouvelles que nous décrivons dans les pages qui suivent.

Les espèces de cette note sont passées en revue par ordre alphabétique.

CROSNIER, A., 1994. — Crustaeea Decapoda : Les *Metapenaeopsis* indo-ouest-pacifiques sans appareil stridulant (Penaeidae). Description de deux espèces nouvelles. *In* : A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Volume 12. *Mém. Mus. natn. Hist. nat.*, **161** : 339-349. Paris ISBN 2-85653-212-8.

Source : MNHN, Paris

Lors de la description des espèces nouvelles, nous supposons que le lecteur connaît les caractères propres à tous les *Metapenaeopsis* et ne les mentionnons pas à nouveau ici, nous contentant de décrire les caractères particuliers à ces espèces. Le lecteur pourra trouver tous les caractères du genre *Metapenaeopsis* en se reportant à notre travail de 1987 (p. 411). De même nous utilisons dans notre description, notamment pour le thélycum et le pétasma, les lettres indiqués sur les figures 1 et 2 de notre travail de 1991.

Metapenaeopsis difficilis Crosnier, 1991

Metapenaeopsis difficilis Crosnier 1991 : 255, fig. 65-67.

Un mâle de cette espèce a été capturé près de l'île Futuna (MUSORSTOM 7, st. CP 498, 14°19'S - 178°03'W, 105-160 m, 10.05.1992), de même qu'une femelle (*Ibidem*, st. DW 508, 14°19'S - 178°04'W, 245-440 m, 11.05.1992).

L'espèce est relativement très colorée, présentant des marbrures blanches et rouge assez vif. Les antennes montrent une alternance de bandes blanches et rouges (ces dernières plus longues que les blanches), très nettement délimitées. Le rostre est décoloré, le scaphocérite rouge sauf à sa base. Le telson et les uropodes présentent une large bande rouge médiane, encadrée, en avant et en arrière par des zones plus claires. Une photo en couleur de cette espèces est publiée dans CROSNIER (1994, fig. 8).

Metapenaeopsis distincta (de Man, 1907)

Metapenaeopsis distincta - CROSNIER, 1991 : 196, fig. 20-21 a-b, 22.

Une femelle de cette espèce a été récoltée dans le lagon sud de l'île Wallis, 13°16'S - 176°15'W (MUSORSTOM 7, st. lagon sud, 52-55 m, 15.05.1992).

Metapenaeopsis evermanni (Rathbun, 1906)

Metapenaeopsis evermanni - CROSNIER, 1991 : 183, fig. 10-11.

Cette espèce a été décrite par RATHBUN d'après une seule femelle. Dans notre travail de 1991, nous avons décrit le mâle de cette espèce d'après un spécimen des îles Chesterfield, tout en faisant remarquer qu'un léger doute pouvait subsister quant à l'appartenance à une même espèce du spécimen des Hawaii examiné par RATHBUN et de ceux des Chesterfield, ces derniers, en particulier, présentant un rostre légèrement plus grêle que le spécimen des Hawaii, à bord inférieur plus sinueux.

Lors d'une visite récente au National Museum of Natural History, à Washington, nous avons trouvé, dans un flacon étiqueté *Metapenaeopsis velutinus*, 3 femelles (Lc = 10,8, 11,1, et 14,1 mm) et un mâle (Lc = 8,6 mm) de *M. evermanni* en provenance des Hawaii (R.V. *"Townsend Cromwell"*, st. TC 36-33, 21°02'N - 157°25'W, 64-66 m, 6.05.1963).

Ces spécimens lèvent tous les doutes concernant l'appartenance à une seule et même espèce du spécimen de RATHBUN et de ceux des Chesterfield, et confirment l'exactitude des dessins du pétasma que nous avons publiés (CROSNIER, 1991, fig. 11 b-c).

Metapenaeopsis ivanovi sp. nov.

Fig. 1-3

MATÉRIEL EXAMINÉ. — **Kenya.** *"Professor Mesyatsev"*, FAO-VNIRO cruise, 23.12.1975, B. G. IVANOV coll. (pas d'autres données): 2 ♂ 10,8 et 10,2 mm; 2 ♀ 13,0 et 12,5 mm.

TYPES. — Une femelle (Lc = 13,0 mm) est l'holotype (ZMMU); un mâle (Lc = 10,8 mm) est l'allolype (ZMMU); une femelle (Lc = 12,5 mm) et un mâle (Lc = 10,2 mm) sont des paratypes (MNHN).

Source : MNHN, Paris

DESCRIPTION. — Le rostre, relativement grêle, est droit chez les mâles, légèrement sinueux chez les femelles. Il porte 7 ou 8 dents, sans compter l'épigastrique. Son extrémité se situe entre la moitié et les quatre cinquièmes du deuxième article du pédoncule antennulaire.

L'épine ptérygostomienne est fine et assez longue.

La formule branchiale est celle habituelle chez les *Metapenaeopsis* (CROSNIER, 1991, tabl. 1).

La carène dorsale du troisième segment abdominal est large, plate et lisse. Sa largeur croît d'avant en arrière : elle est égale au douzième de la longueur de la carène vers son extrémité antérieure, au huitième vers son extrémité postérieure.

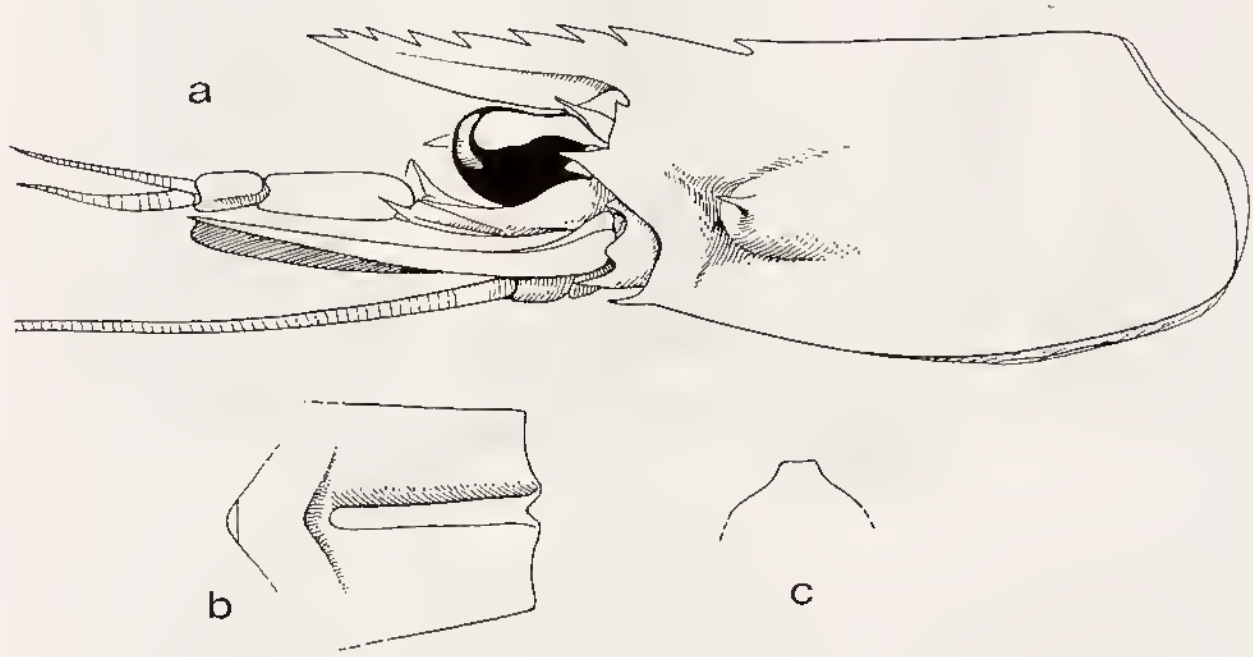

FIG. 1. — *Metapenaeopsis ivanovi* sp. nov., ♀ holotype 13,0 mm, *"Professor Mesyatsev"*, FAO-VNIRO cruise, 23.12.1975 : **a**, partie antérieure du corps; **b-c**, troisième segment abdominal, vue dorsale et coupe transversale.

Le thélycum présente une plaque thélycale creusée en cuiller du côté ventral; le bord antérieur de cette plaque présente une dent médiane bien visible; de part et d'autre de cette dent le bord est concave; les bords antérolatéraux sont régulièrement arrondis ; les bords latéraux sont nettement convergents vers l'arrière. La plaque thélycale est relativement large, le rapport de sa largeur à sa longueur (mesurée du bord antérieur, épine médiane exclue, à la base des bourrelets de la zone intermédiaire) est voisin de 1,5. La zone intermédiaire porte les orifices des deux réceptables séminaux qui sont bordés par un bourrelet sur leur partie antéro-externe, s'appuyant sur la plaque transversale. Cette dernière a un bord antérieur un peu sinueux (chacune de ses moitiés est très légèrement concave); sa face ventrale est déprimée en son centre et ses extrémités latérales sont légèrement tétraédriques. La plaque postérieure est divisée en trois lobes; le médian, triangulaire, est le plus saillant et porte un denticule; les latéraux sont plus arrondis et dissymétriques, leur bord externe étant nettement plus long que l'interne. Entre les deuxièmes péréiopodes se trouve une paire de longues épines et, entre les troisièmes, une paire de tubercules.

— le pétasma présente deux valves lisses, non renflées en vue ventrale et sans excroissance développée. La valve droite, en doigt de gant fendu, recouvre étroitement l'élément distoventral. La valve gauche, fortement recourbée dans sa partie distale, recouvre l'élément spiralé et une partie de l'élément distodorsal gauche. L'élément distoventral a une forme très particulière : en vue ventrale il apparaît comme une massue à partie distale très renflée et à partie basale fine sur le devant, puis fortement renflée en arrière-plan du côté externe (fig. 3 c), un examen sous d'autres faces montre, du côté dorsal, la présence d'une lamelle développée, perpendiculaire au plan ventral (fig. 3 d-e). La partie distale de l'élément distodorsal gauche présente, en vue dorsale, un aspect circulaire avec une petite protubérance du côté externe (fig. 3 d).

Source : MNHN, Paris

FIG. 2. — *Metapenaeopsis ivanovi* sp. nov., ♀ holotype 13,0 mm, *"Professor Mesyatsev"*, FAO-VNIRO cruise, 23.12.1975, vue ventrale des sternites thoraciques V-VIII.

TAILLE. — L'espèce semble plutôt petite. Le plus grand spécimen connu est la femelle holotype dont la longueur totale n'excède pas 60 mm (Lc = 13,0 mm).

ETYMOLOGIE. — Cette espèce est dédiée au Dr Boris G. IVANOV qui l'a récoltée et qui est l'auteur de diverses contributions sur les Crustacés décapodes de l'océan Indien.

REMARQUES. — Cette espèce fait partie de ce que nous avons appelé, dans notre travail de 1991, le groupe *faouzii* qui comprend *M. faouzii* (Ramadan, 1938), *M. proxima* Crosnier, 1991, *M. mannarensis* de Bruin, 1965, et *M. spiridonovi* Crosnier, 1991.

Dans ce groupe, les mâles de *M. ivanovi* se distinguent immédiatement par les éléments du pétasma complètement différents de ceux des autres espèces.

En ce qui concerne les femelles, la carène dorsale du troisème segment abdominal bien en relief, large, plate et lisse, sépare *M. ivanovi* de *M. proxima* (carène très fine dans sa partie antérieure, puis divisée en deux branches), de *M. mannarensis* (carène peu en relief, large et convexe) et de *M. faouzii* (carène ponctuée; cette dernière espèce porte par ailleurs de 9 à 11 dents rostrales au lieu de 7 ou 8 chez *M. ivanovi*). Par contre, séparer correctement les femelles de *M. spiridonovi* et *M. ivanovi*, en l'absence de mâles, ne nous paraît pas évident : il semble bien que la carène du troisième segment abdominal soit toujours légèrement rétrécie vers son milieu chez *M. spiridonovi*, ce qui semble n'être jamais le cas chez *M. ivanovi*; de même le bord antérieur de la plaque transversale du sternite thoracique VIII est un peu plus sinueux chez *M. ivanovi* que chez *M. spiridonovi* (comparez les figures 2 et 7). On peut aussi mentionner que les bourrelets qui entourent les orifices des vésicules séminales ont un contour plus arrondi et que les deux tubercules se trouvant entre les troisièmes péréiopodes sont moins marqués chez *M. ivanovi* que chez *M. spiridonovi* , mais ces deux dernières différences sont faibles, vraisemblablement assez variables et, somme toute, difficiles à apprécier.

Source : MNHN, Paris

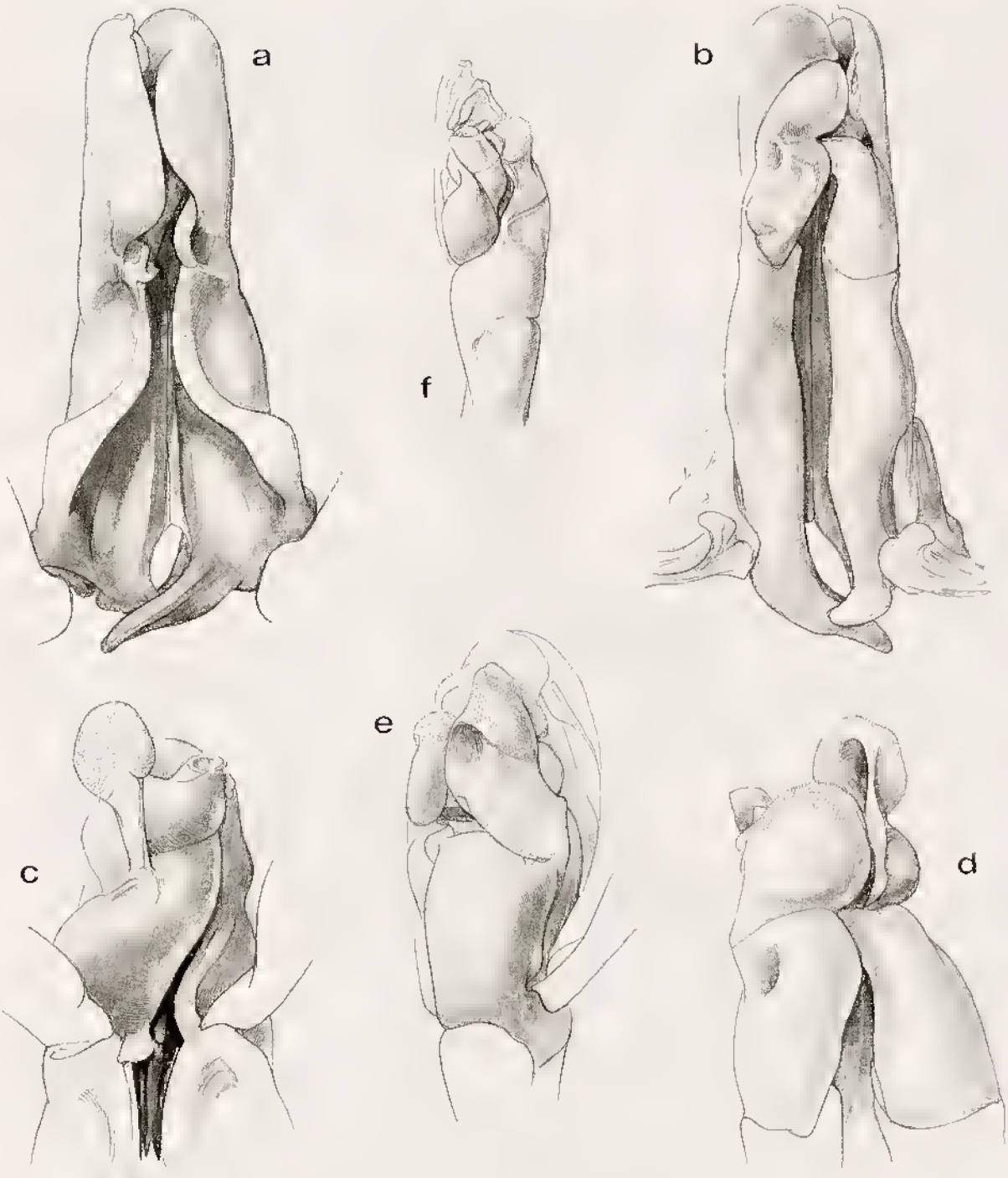

FIG. 3. — *Metapenaeopsis ivanovi* sp. nov., ♂ allotype 10,8 mm, *"Professor Mesyatsev"*, FAO-VNIRO cruise, 23.12.1975. Pètasma : **a**, vue ventrale; **b**, vue dorsale; **c**, vue ventrale de la partie distale, valves écartées; **d**, vue dorsale de la partie distale, valves écartées; **e** partie distale vue du côté droit, valve droite écartée; **f**, partie distale vue du côté gauche, valve gauche écartée.

DISTRIBUTION. — Nous possédons peu de renseignements sur les conditions exactes de récolte de cette espèce. Nous savons toutefois qu'elle a été trouvée au large du Kenya et récoltée lors d'un chalutage. Il semble exclu qu'elle puisse provenir de profondeurs importantes.

Source : MNHN, Paris

Metapenaeopsis manningi sp. nov.

Fig. 4-6

MATÉRIEL EXAMINÉ. — **Somalie.** IIOE (Année internationale de l'océan Indien), *"Anton Bruun"*, Cruise 9, st. 449, 10°03'N - 51°15'E, 31-39 m, 16. 12. 1964 : 89 ♂ 9,9 à 17,1 mm (USNM), 4 ♂ 12,2 à 16,5 mm (MNHN-Na 12836); 86 ♀ 10,9 à 22,3 mm (USNM), 4 ♀ 12,6 à 18,0 mm (MNHN-Na 12836).

TYPES. — Une femelle (Lc = 17,8 mm) est l'holotype (USNM 264879); un mâle (Lc = 15,0 mm) est l'allotype (USNM 264879); 67 femelles et 78 mâles (USNM 264880) et 4 femelles et 4 mâles (MNHN-Na 12836) sont des paratypes.

DESCRIPTION. — Le corps est massif et pubescent. Il n'y a pas d'appareil stridulant.

Le rostre, assez fort, légèrement dirigé vers le haut, est droit ou faiblement recourbé dorsalement. Il porte le plus souvent 8 (parfois 9) dents, sans compter l'épigastrique. Ces dents sont peu espacées les unes des autres. Le rostre est de longueur moyenne : son extrémité se situe au niveau des trois ou quatre cinquièmes du deuxième article du pédoncule antennulaire (fig. 4 a).

L'épine ptérygostomienne est petite.

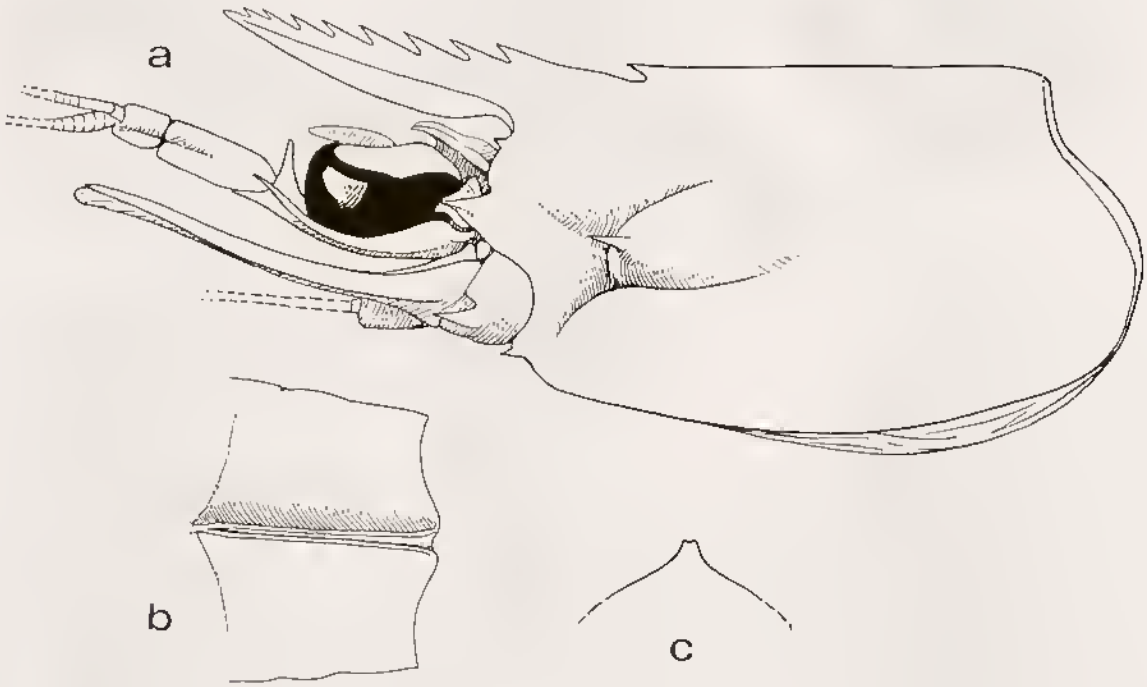

FIG. 4. — *Metapenaeopsis manningi* sp. nov., ♀ holotype 17,8 mm, *"Anton Bruun"*, cruise 9, st. 449 (USNM 264879) : a, partie antérieure du corps; b-c, troisième segment abdominal, vue dorsale et coupe transversale.

La formule branchiale est celle habituelle pour les *Metapenaeopsis* (CROSNIER, 1991, tabl. 1).

La carène dorsale du troisième segment abdominal est bien en relief, peu large (elle est à peine plus large dans sa partie postérieure que dans sa partie antérieure) et creusée d'un profond sillon sur toute sa longueur (fig. 4 b-c).

Le thélycum présente une plaque thélycale creusée en cuiller du côté ventral; le bord antérieur de cette plaque, garni de longues soies, est orné d'une petite dent médiane plus ou moins marquée suivant les spécimens et est très légèrement concave de part et d'autre de cette épine; les bords antérolatéraux de cette plaque sont plus ou moins régulièrement arrondis. En arrière de la plaque thélycale, on trouve une paire de dents contiguës, assez larges, dont la partie distale est arrondie; ces dents sont formées, chacune, par un double repli du bord postérieur du sternite thoracique VII. La plaque transversale a ses parties latérales qui se prolongent, chacune, en une dent aplatie dorsoventralement, très longue, acérée, à bord externe fortement convexe et à bord interne concave (fig. 5); le

Source : MNHN, Paris

bord antérieur de cette plaque est sinueux, concave en son centre puis convexe, chaque convexité se raccordant au bord interne de la dent latérale correspondante. La plaque postérieure est découpée en un lobe médian, large et bas, qui porte une petite dent médiane très aiguë près de son bord antérieur, et en deux lobes légèrement plus hauts, beaucoup plus étroits, à sommet arrondi, et qui sont un peu dissymétriques, leur bord externe étant plus long que l'interne. Entre les troisièmes péréiopodes, on observe une paire d'excroissances dentiformes, arrondies distalement, disposées côte à côte et, entre les deuxièmes, une paire de longues épines.

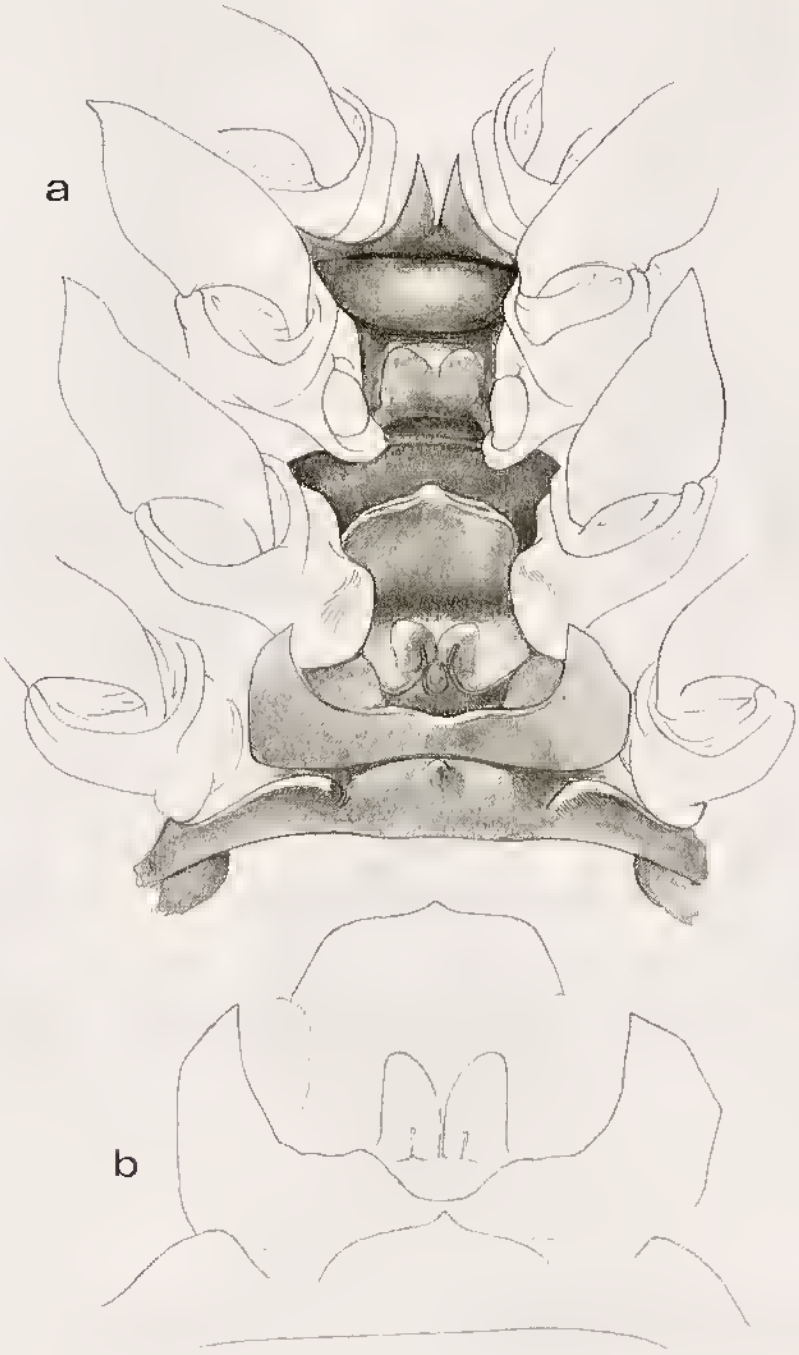

FIG. 5. — *Metapenaeopsis manningi* sp. nov., ♀ holotype 17,8 mm, "*Anton Bruun*", cruise 9, st. 449 (USNM 264879). Sternites thoraciques V-VIII ; **a**, vue ventrale; **b**, vue de trois quarts arrière.

Source : MNHN, Paris

Le pétasma présente une valve droite très développée, fortement renflée dans sa moitié distale, avec des circonvolutions plus ou moins nettes. Cette valve encapuchonne largement les éléments distoventral et spiralé. La valve gauche est en forme de ruban; spiralée, elle s'élargit dans sa partie médiane et se rétrécit fortement dans sa partie distale; elle se termine par une longue pointe précédée d'une au deux autres pointes ou par un lobule aplati, bi- ou tridenté. L'élément distoventral, aplati dorsoventralement, présente, en vue ventrale, un bord externe concave et un bord interne convexe, les deux bords se rejoignant suivant une pointe mousse, dirigée antérolatéralement du côté externe (fig. 6 a). L'élément distodorsal gauche présente, dans sa partie antérolatérale externe, une excroissance en auvent, recourbée ventrodorsalement et un bord antérotatéral interne sinueux. Un cordon de denticules épouse plus ou moins, en retrait, le contour de l'auvent et d'une partie du bord antérieur. En vue dorsale, l'auvent forme une forte pointe antérolatérale externe (fig. 6 h, d-e).

TAILLE. — Le plus grand mâle observé a une carapace mesurant 17,1 mm et une longueur totale de 77 mm; la plus grande femelle, une carapace mesurant 22,3 mm et une longueur totale de 79 mm.

ÉTYMOLOGIE. — Cette espèce est dédiée à Raymond B. MANNING, du National Museum of Natural History, pour l'aide constante qu'il nous apporte et pour la chaleur et l'efficacité de son accueil lors de nos séjours à Washington.

REMARQUES. — Cette espèce appartient au groupe des *Metapenaeopsis* sans appareil stridulant qui présentent, en arrière de la plaque thélycale, une paire d'excroissances plus ou moins dentiformes, formées par un double repli du bord postérieur du sternite thoracique VII et dont la plaque transversale du thélycum présente, le plus souvent, deux dents latérales externes bien développées mais peut aussi être découpée en trois ou quatre lobes ou dents. Dans ce groupe, les pétasmas ont une valve droite nettement plus développée que la gauche et cette dernière se termine presque toujours par des excroissances plus ou moins en forme de digitations et l'élément distoventral a la forme, en vue ventrale, d'un triangle plus ou moins marqué posé sur un pédoncule, la base vers l'avant. Ce groupe comprend actuellement 11 espèces et trois sous-espèces qui sont citées dans CROSNIER, 1991 : 286.

M. manningi par la conjonction de la carène de son troisième segment abdominal étroite et creusée d'un sillon sur toute sa longueur, la forme arrondie des dents situées en arrière de la plaque thélycale, le grand développement des dents latérales de la plaque transversale du thélycum, la forme des éléments distoventral et distodorsal gauche du pétasma, ne peut être confondue avec aucune des autres espèces existant déjà dans ce groupe.

La découverte d'une nouvelle espèce dans ce groupe ne nous étonne pas. Il s'agit visiblement d'un groupe très diversifié et nous sommes convaincu que de nombreuses espèces lui appartenant restent encore à découvrir.

Metapenaeopsis marquesas Crosnier, 1991

Metapenaeopsis marquesas Crosnier, 1991 : 244, fig. 57-59.

Un mâle et une femelle de cette espèce ont été récoltés dans le lagon de Nouvelle-Calédonie par J.-L. MENOU. Cette récolte étend fortement la répartition géographique de cette espèce qui n'était encore connue que des îles Marquises, en Polynésie.

Metapenaeopsis menoui Crosnier, 1991

Metapenaeopsis menoui Crosnier, 1991 : 180, fig. 6 c-d, 8, 9.

Un mâle et une femelle de cette espèce, décrite des Seychelles, ont été récoltés par le R.V. *"Professor Mesyatsev"* sur le banc Fortune (Ride des Mascareignes), le 16 avril 1976. Ce matériel est déposé au Zoological Museum de l'Université de Moscou.

Source : MNHN, Paris

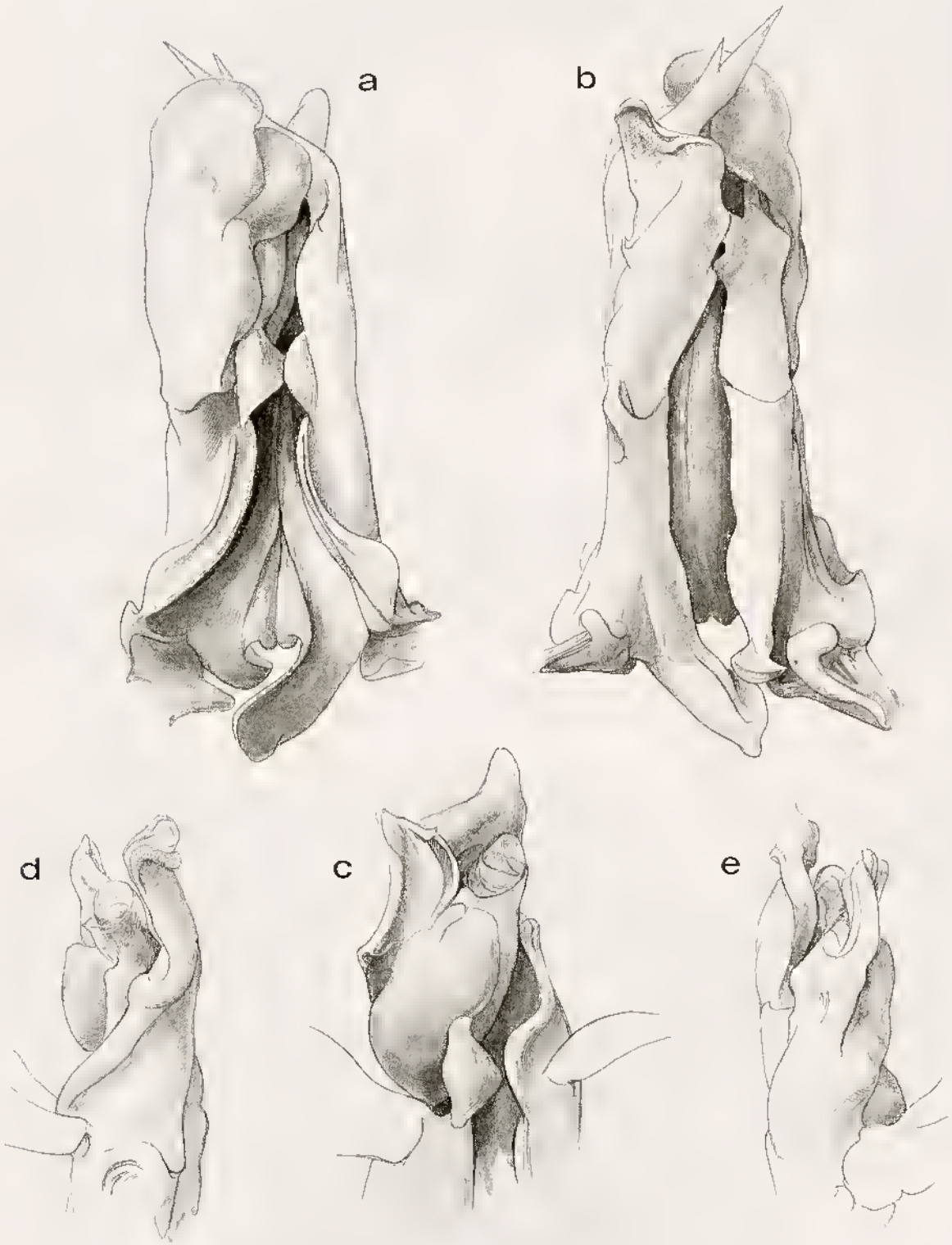

FIG. 6. — *Metapenaeopsis manningi* sp. nov., ♂ allotype 15,0 mm, *"Anton Bruun"*, cruise 9, st. 449 (USNM 264879). Pétasma : **a**, vue ventrale; **b**, vue dorsale; **c**, vue ventrale de la partie distale, valves écartées; **d**, partie distale vue du côté droit, valves écartées; **e**, partie distale vue du côté gauche, valves écartées.

Source : MNHN, Paris

Metapenaeopsis mogiensis (Rathbun, 1902)

Parapenaeus mogiensis Rathbun, 1902 : 39, fig. 6-8.

Sous ce nom, BORRADAILE (1909 : 257) a identifié de nombreux spécimens récoltés aux îles Maldives et aux îles Seychelles.

Grâce au Dr R. C. PREECE et à Mr R. J. SYMONDS de l'University Museum of Zoology à Cambridge, nous avons pu réexaminer la plus grande partie du matériel de BORRADAILE.

Assez curieusement, il ne renferme aucune *M. mogiensis*, mais nous y avons trouvé, outre un spécimen de *Trachypenaeus* :

— en provenance des îles Maldives, *Metapenaeopsis commensalis* (Borradaile, 1898), *M. gallensis* (Pearson, 1905), *M. hilarula* (de Man, 1911), *M. faouzii* (Ramadan, 1938), *M. tarawensis* Racek & Dall, 1965, *M. ceylonica* Starobogatov, 1972, *M. aegyptia* Galil & Golani, 1990.

— en provenance des îles Seychelles, *M. hilarula* (De Man, 1911), *M. faouzii* (Ramadan, 1938), *M. proxima* Crosnier, 1991.

Il faut remarquer que toutes ces espèces étaient déjà connues de ces régions.

Metapenaeopsis spiridonovi Crosnier, 1991

Fig. 7

Metapenaeopsis spiridonovi Crosnier, 1991 : 268, fog. 77 a-f, 78 d.

Lorsque nous avons décrit cette espèce, nous n'avons pas donné de dessin du thélycum. Nous comblons donc ici cette lacune.

FIG. 7. — *Metapenaeopsis spiridonovi* Crosnier, 1991, ♀ holotype 18,3 mm, îles Seychelles, REVES 2, st. 33 (MNHN-Na 12718). Vue ventrale des sternites thoraciques V-VIII.

Source : MNHN, Paris

Metapenaeopsis velutina (Dana, 1852)

Metapenaeopsis velutina - CROSNIER, 1991 : 247, fig. 60-61.

ORTMANN (1890 : 452) mentionne, sous le nom de *Penaeus velutinus*, trois récoltes. Grâce à l'amabilité de Mme E. LANG et de M. X. DEWITZ du Musée zoologique de Strasbourg, nous avons pu examiner deux de ces trois récoltes.

L'une est composée de deux mâles (Lc = 8,0 et 12,5 mm), étiquetés Japon, Kadsiyama, DÖDERLEIN coll., 1880. Ce sont des *Metapenaeopsis dalei* (Rathbun, 1902).

L'autre comprend un mâle (Lc = 12,0 mm), étiqueté "Ost-Indien". Mus. GODEFFROY vend., 1888 qui est une *Metapenaeopsis barbata* (de Haan, 1844).

La troisième récolte mentionnée par ORTMANN (Japon, Kagoshima, DÖDERLEIN coll., 1880) n'a pu être encore retrouvée.

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B. G. IVANOV du Russian Federal Research Institute of Fisheries & Oceanography, à Moscou, E. LANG et X. DEWITZ du Musée zoologique de Strasbourg, R. B. MANNING du National Museum of Natural History, à Washington, J.-L. MENOU du Centre ORSTOM de Nouméa, Nouvelle-Calédonie, V. A. SPIRIDONOV de l'Université de Moscou ont permis la rédaction de cette note par le matériel qu'ils m'ont fourni.

M. GAILLARD a effectué tous les dessins publiés ici.

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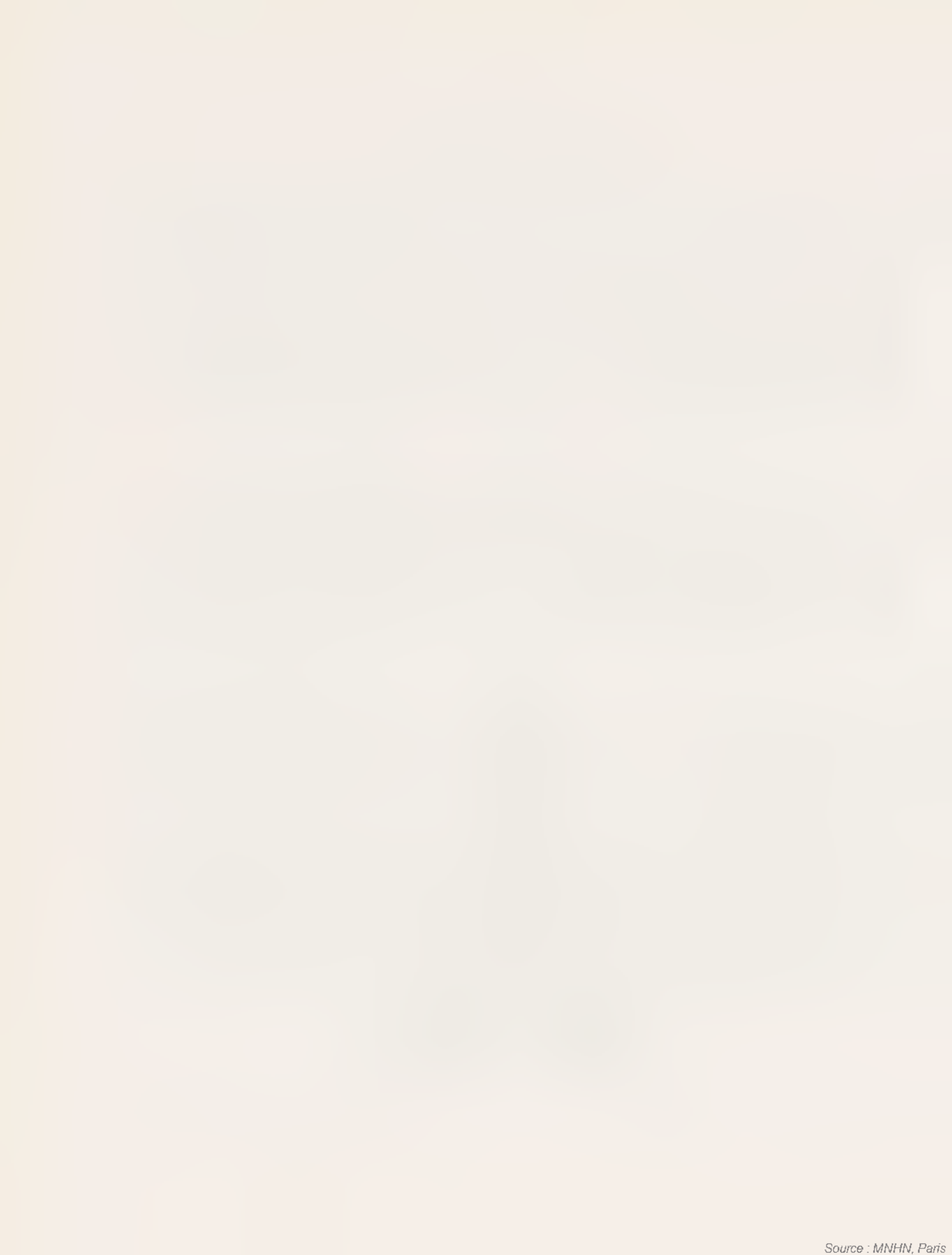
Source : MNHN, Paris



Source : MNHN, Paris

9

Crustacea Decapoda : Penaeoidea récoltés lors de la campagne KARUBAR en Indonésie

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RÉSUMÉ

Trente-sept espèces de crevettes pénéides d'eau profonde ont été récoltées, en Indonésie, dans l'est des Moluques, lors de la campagne franco-indonésienne KARUBAR. La plupart d'entre elles étaient déjà connues d'Indonésie ou de régions avoisinantes. L'une, *Solenocera barunajaya*, nouvelle pour la science, est décrite et comparée aux espèces voisines.

ABSTRACT

Crustacea Decapoda : Penaeoidea collected in Indonesia during the KARUBAR Cruise.

During the french-indonesian campaign KARUBAR, mainly devoted to the deepwater fauna, carried out in Indonesia, in the east part of the Moluccas, 37 species of peneid shrimps were collected. Most of them had previously been recorded from the region (or those nearby). One of them, *Solenocera barunajaya*, is described as new and compared with related species.

Du 21 octobre au 6 novembre 1991, une campagne franco-indonésienne en mer profonde a eu lieu dans l'est des Moluques, à bord du *"Baruna Jaya I"*, navire de recherche indonésien. Les zones prospectées ont été les îles Kai d'une part, la zone située à l'est des îles Tanimbar d'autre part. Quatre-vingt-onze dragages et chalutages ont été effectués entre 85 et 1200 m de profondeur. Nous donnons, ci-après, les résultats obtenus concernant les crevettes pénéides. Les récoltes ont été partagées entre le Muséum national d'Histoire naturelle (MNHN), à Paris, et le Puslitbang Oseanologi - LIPI (POLIPI), à Djakarta.

Seuls des comptes rendus en indonésien ayant été publiés sur cette campagne, nous donnons, en annexe de cette note, la liste complète des stations effectuées.

Famille BENTHESICYMIDAE

Benthesicymus investigatoris Alcock & Anderson, 1899

Stations CP 52, 1244-1266 m. — CP 53, 1026-1053 m. — CC 57, 603-620 m. — CP 87, 1017-1024 m. — CP 89, 1058-1084 m.

CROSNIER, A., 1994. — Crustacea Decapoda : Penaeoidea récoltés lors de la campagne KARUBAR en Indonésie. *In* : A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Volume 12. *Mém. Mus. natn. Hist. nat.*, **161** : 351-365. Paris ISBN 2-85653-212-8.

Source : MNHN, Paris

Gennadas bouvieri Kemp, 1909
Station CP 75, 840-855 m.

Famille ARISTEIDAE

Le matériel examiné étant suffisamment frais pour que les photophores, lorsqu'ils existent, soient encore aisément discernables, nous donnons ci-après des relevés de ces photophores concernant les diverses espèces d'*Aristeus* récoltées. Nous pensons, en effet, que les nombres de photophores des péréiopodes fournissent, dans ce genre, des renseignements très valables pour l'identification des espèces. Il semble que d'une région à l'autre les limites de variations puissent varier quelque peu pour une même espèce, mais malgré cela, et même si des recoupements s'observent parfois entre des espèces, l'information recueillie nous semble précieuse.

Aristeus mabahissae Ramadan, 1938
Stations CP 20, 769-810 m. — CC 21, 688-694 m. — CP 89, 1058-1084 m.

	P1	P2	P3	P4	P5
Carpe	6 à 9	2 à 5	0 à 3	8	8 à 10
Propode	0 à 1	1	1	8	10 à 11
Dactyle	0	0	0	0	5 à 6

Tableau 1. — Nombres de photophores relevés sur les péréiopodes d'*Aristeus mabahissae*.

REMARQUE. — Ces nombres, basés malheureusement sur trois spécimens incomplets seulement, correspondent bien à ceux donnés dans notre travail de 1978 (tabl. 4).

Aristeus semidentatus Bate, 1881
Stations CP 38, 620-668 m. — CC 56, 549-552 m.

	P1	P2	P3	P4	P5
Carpe	12 à 22	8 à 16	5 à 14	12 à 32	13 à 33
Propode	3 à 6	2 à 6	0 à 4	16 à 28	20 à 31
Dactyle	0	0	0	0	11 à 16

Tableau 2. — Nombres de photophores relevés sur les péréiopodes d'*Aristeus semidentatus* (15 spécimens, Lc comprise entre 15,5 et 36,0 mm).

REMARQUE. — Les photophores des deux juvéniles examinés (Lc = 15,5 et 16,5 mm) correspondent bien aux relevés que nous avons donnés dans notre travail de 1978 (tabl. 4) pour cette espèce, relevés malheureusement basés uniquement sur 4 femelles adultes (Lc comprise entre 30,0 et 35,0 mm) récoltées à Madagascar. Les relevés, effectués sur les adultes récoltés lors de KARUBAR, montrent une variation nettement plus forte.

Aristeus virilis Bate, 1881
Stations CP 19, 576-605 m. — CP 20, 769-809 m. — CC 21, 688-694 m. — CP 54, 836-869 m. — CC 56, 549-552 m. — CP 72, 676-699 m.

	P1	P2	P3	P4	P5
Carpe	7 à 9	5 à 8	3 à 7	8 à 15	8 à 11
Propode	2 à 3	2 à 3	2 à 3	10 à 13	11 à 13
Dactyle	0	0	0	3 à 4	4 à 8

Tableau 3. — Nombres de photophores relevés sur les péréiopodes d'*Aristeus virilis* (8 spécimens, Lc comprise entre 29,5 et 58,5 mm).

Source : MNHN, Paris

REMARQUES. — Les nombres relevés pour cette espèce sont assez nettement inférieurs, surtout en ce qui concerne les P4 et P5, à ceux relevés sur des spécimens malgaches (voir CROSNIER, 1978, tabl. 4).

Parahepomadus vaubani Crosnier, 1978
Stations CP 52, 1244-1266 m. — CP 53, 1026-1053 m. — CP 87, 1017-1024 m.

Pseudaristeus kathleenae Pérez Farfante, 1987
Stations CP 54, 836-869 m. — CP 72, 676-699 m. — CP 73, 840-855 m.

REMARQUES. — Je ne suis pas convaincu de la validité de *Pseudaristeus protensus* Pérez Farfante, 1987, décrit d'après seulement 2 femelles provenant des côtes est et ouest de l'Inde. En effet, cette espèce se distinguerait par la plaque thélycale longue et étroite. Mais ce caractère semble varier assez fortement avec la taille et l'une de nos femelles de *P. kathleenae* présente une plaque thélycale qui pourrait la rattacher à *P. protensus*. D'après les figures 4 C et 4 D de PÉREZ FARFANTE (1987), *P. protensus* se différencierait également de *P. kathleenae* par le tubercule du bord mésial du pédoncule oculaire, situé beaucoup plus loin de la cornée. Mais, ici aussi, il semble que ce caractère soit variable : chez nos mâles de *P. kathleenae*, les pédoncules oculaires correspondent bien à la figure 4 C de PÉREZ FARFANTE (relative d'ailleurs à un mâle), tandis que, chez nos femelles, le pédoncule oculaire correspond bien à la figure 4 D de PÉREZ FARFANTE, relative à un *P. protensus* femelle. On peut remarquer aussi, sur ce dernier point, que les figures 2 et 3 de PÉREZ FARFANTE, relatives à des femelles de *P. kathleenae*, montrent des pédoncules oculaires du type 4 D (supposé correpondre à *P. protensus*). Tout se passe donc comme si les pédoncules oculaires présentaient un dimorphisme sexuel, étant plus allongés chez les femelles que chez les mâles. Dans ces conditions, la question me paraît réellement se poser de savoir si *P. protensus* n'est pas synonyme de *P. kathleenae*.

Pseudaristeus sibogae de Man, 1911
Stations CP 52, 1244-1266 m. — CP 53, 1026-1053 m. — CP 54, 836-869 m.

Famille SOLENOCERIDAE

Hadropenaeus lucasi (Bate, 1881)
Stations CP 05, 296-299 m. — CP 33, 307-311 m. — CP 35, 390-502 m. — CP 82, 215-219 m. — CP 83, 285-297 m. — CP 84, 246-275 m. — CP 85, 240-245 m.

Haliporoides sibogae (de Man, 1907)
Stations CP 12, 413-436 m. — CP 09, 368-389 m. — CC 10, 329-389 m.

Haliporus taprobanensis Alcock & Anderson, 1899
Station CC 57, 603-620 m.

Hymenopenaeus equalis (Bate, 1888)
Stations CP 09, 368-389 m. — CC 10, 329-389 m. — CP 12, 413-436 m. — CP 39, 466-477 m. — CC 40, 443-468 m. — CC 41, 393-401 m. — CC 58, 457-461 m. — CP 59, 399-405 m. — CP 69, 356-368 m. — CP 70, 410-413 m. — CP 71, 477-480 m. — CP 75, 451-452 m.

Hymenopenaeus halli Bruce, 1966
Station CP 19, 576-605 m.

Hymenopenaeus neptunus (Bate, 1881)
Stations CP 52, 1244-1266 m. — CP 89, 1058-1084 m.

Source : MNHN, Paris

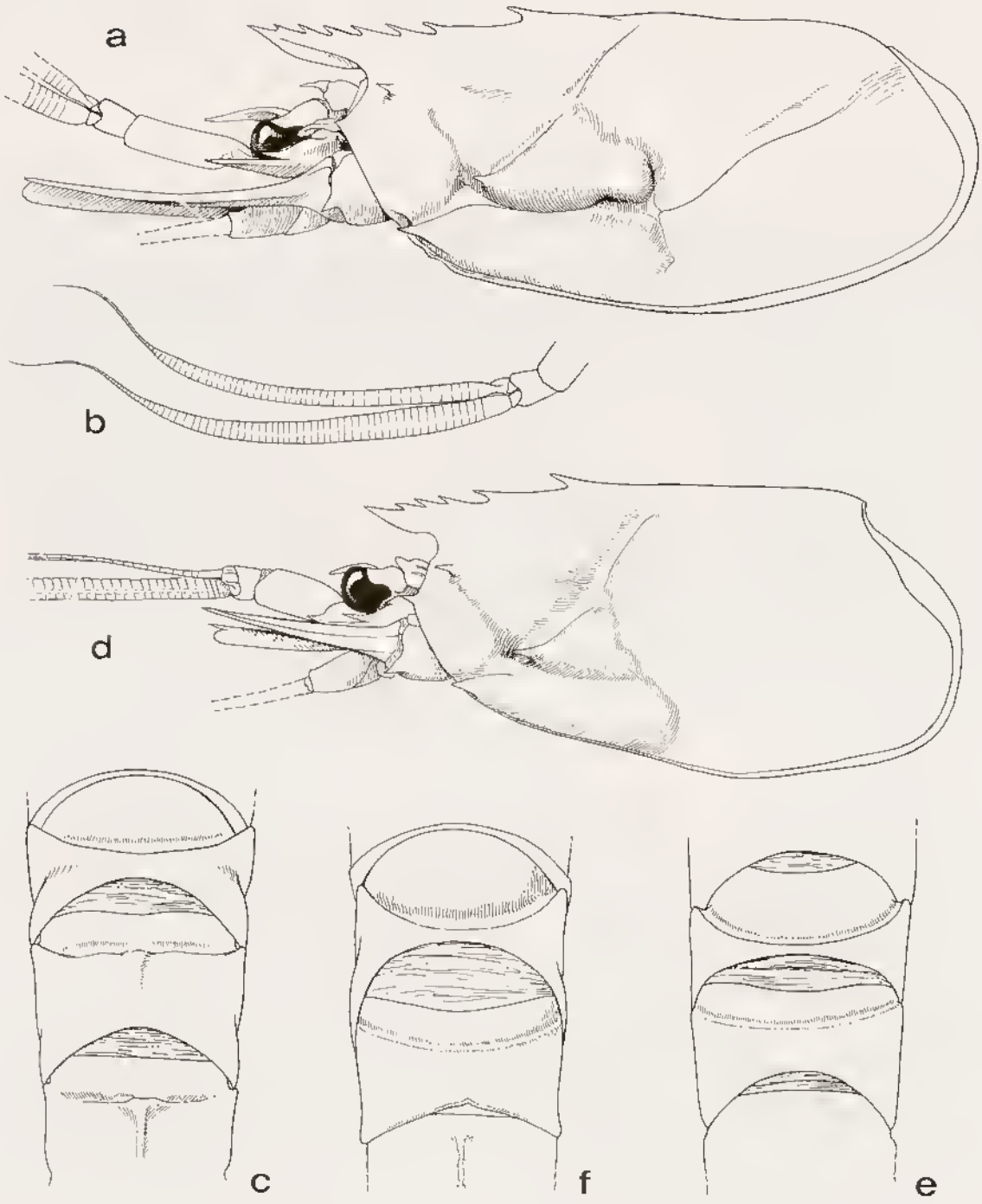

FIG. 1 a-c. — *Solenocera barunajaya* sp. nov., ♀ holotype 29,5 mm, Indonésie, KARUBAR, st. CP 83, 285-297 m (MNHN-Na 12920) : a, partie antérieure du corps; b, flagelles antennulaires gauches; c, premier et second segments abdominaux, vue dorsale.

FIG. 1 d-e. — *Solenocera faxoni* de Man, 1907, ♀ 20,5 mm, Australie, Marian plateau, "*Soela*", cruise 685, st. 23, 20°49,75'S, 152°20,60'E, 314-319 m, 21.11.85 : d, partie antérieure du corps; e, premier et second segments abdominaux, vue dorsale.

FIG. 1 f. — *Solenocera moosai* Crosnier, 1985, ♂ 17,0 mm, holotype, Indonésie, CORINDON 2, st. 273, 1°56,0'S, 119°16,0'E, 120-200 m (MNHN-Na 9032) : premier et second segments abdominaux, vue dorsale.

Source : MNHN, Paris

Hymenopenaeus propinquus de Man, 1907

Stations CP 19, 576-605 m. — CP 20, 769-809 m. — CC 21, 688-694 m. — CP 38, 620-666 m. — CP 52, 1244-1266 m. — CP 53, 1026-1053 m. — CC 56, 549-552 m. — CC 57, 603-620 m. — CP 72, 676-699 m. — CP 87, 1016-1024 m. — CP 91, 884-891 m.

Solenocera annectens Wood Mason, 1891

Stations CC 12, 412-436 m. — CP 35, 390-502 m. — CP 38, 620-666 m. — CP 39, 466-477 m. — CC 40, 443-468 m. — CC 56, 549-552 m. — CP 59, 399-405 m. — CP 71, 477-480 m. — CP 75, 451-452 m.

Nous avons également examiné des spécimens de cette espèce provenant du nord de l'Australie (18°40,5'S, 117°03,6'E, 450 m; 17°37,6'S, 119°24,7'E, 305 m).

Solenocera comata Stebbing, 1915

Stations CP 84, 246-275 m. — CP 85, 240-245 m. — CP 85, 240-245 m. — CP 86, 223-225 m.

Solenocera melantho de Man, 1907

Stations CP 62, 246-253 m. — CP 63, 214-215 m. — CP 79, 239-250 m.

Solenocera moosai Crosnier, 1985

Station CP 63, 214-215 m.

Solenocera barunajaya sp. nov. (fig. 1a-c, 2a, 3 a-c)

MATÉRIEL EXAMINÉ. — **Indonésie**. *Iles Kai*. KARUBAR : st. CC 10, 5°21'S, 132°30'E, 329-389 m, 23.10.1991 : 1 ♂ 22,2 mm (POLIPI).

Iles Tanimbar. KARUBAR : st. CP 69, 8°42'S, 131°53'E, 356-368 m, 2.11.1991 : 1 ♂ 20,5 mm (MNHN); 1 ♀ 19,8 mm (POLIPI). — St. CP 79, 9°16'E, 131°22'E, 239-250 m, 3.11.1991 : 1 ♂ 16,0 mm; 1 ♀ 19,6 mm et 1 ♀ 25,1 mm (MNHN-Na 12921). — St. CP 83, 9°23'S, 131°00'E, 285-297 m, 4.11.1991 : 1 ♂ 14,3 mm (MNHN); 1 ♂ 16,0 mm (MNHN-Na 12922); 1 ♂ 17,3 mm (USNM); 1 ♂ 19,5 mm (MNHN-Na 12920); 2 ♀ 14,4 et 18,0 mm (MNHN); 1 ♀ 20,6 mm (USNM); 1 ♀ 29,5 mm (MNHN-Na 12920). — St. CP 84, 9°23'S, 131°09'E, 246-275 m, 1.11.1991 : 1 ♂ 20,0 mm; 1 ♀ 25,4 mm (POLIPI). — St. CP 85, 9°22'S, 131°14'E, 240-245 m, 4.11.1991 : 1 ♂ 20,4 mm (MNHN).

Nord de l'Australie. "*Soela*", Cr 0184, st. 1, 27.01.1984 : 1 ♂ 14,0 mm; 2 ♀ 22,2 et 22,5 mm. — "*Noble Pearl*", mer de Timor, 09°46'S, 129°54'E, 298 m, 22.09.1987 : 4 ♀ 22,2 à 27,8 mm. — "*Dampier Pearl*", mer de Timor, shot 4, 27.06.1988 : 1 ♀ 28,8 mm. — Shot 5, 7.07.1988 : 2 ♀ 21,9 et 24,2 mm. Tous ces spécimens sont déposés au Northern Territory Museum of Arts and Sciences, à Darwin.

TYPES. — L'une des femelles (Lc = 29,5 mm) récoltée à la station CP 83 est l'holotype (MNHN-Na 12920); un mâle (Lc = 19,5 mm), récolté à la même station, est l'allotype (MNHN-Na 12920 également). Les autres spécimens récoltés en Indonésie sont les paratypes.

DESCRIPTION. — La carapace est glabre avec seulement quelques soies sur le bord dorsal du rostre, entre les dents rostrales et postrostrales.

Le rostre est bien développé; son extrémité atteint celle de la cornée de l'œil chez les mâles et la dépasse chez les femelles; son bord supérieur, à peu près droit ou légèrement recourbé vers le haut, est sensiblement dans le prolongement du bord dorsal de la carapace; son bord ventral est nettement convexe, parfois légèrement sinueux dans sa partie distale chez les femelles où la pointe du rostre est un peu plus allongée que chez les mâles. On compte 6 dents rostrales et postrostrales, de taille voisine, proches les unes des autres, et une dent épigastrique, nettement séparée des dents postrostrales et située à égale distance de la pointe de la première dent postrostrale et du sillon cervical. La troisième dent postrostrale se situe au niveau de l'orbite.

La carène postrostrale, en arrière du sillon cervical, est le plus souvent absente, parfois marquée, juste en arrière du sillon, sur une courte distance.

La carapace porte des épines postorbitaire, antennaire et hépatique mais pas d'épine orbitaire. L'épine antennaire est nettement plus petite que les deux autres, qui sont subégales. La région hépatique est fortement renflée et délimitée postérieurement par un sillon sinueux, tandis que la carène hépatique forme, à son extrémité, un fort lobe dentiforme, aigu, qui dépasse légèrement le bord de la carapace. Les sillons cervical, hépatique et branchiocardiaque sont bien marqués.

Source : MNHN, Paris

Les yeux sont bien colorés et gros.

Les antennules ont un prosartéma qui dépasse l'extrémité du rostre; leur pédoncule s'étend jusqu'aux neuf dixièmes du scaphocérite environ. Les flagelles antennulaires supérieur et inférieur se terminent tous deux en un long filament (fig. 2 a), celui du flagelle supérieur étant assez nettement plus long que celui de l'inférieur. D'après la douzaine de flagelles pratiquement entiers (cassés très près de leur extrémité) dont nous avons pu compter les articles, les flagelles supérieurs comptent de 62 à 74 articles et les inférieurs de 64 à 71. Les flagelles supérieurs sont à peine plus longs (1,05 fois habituellement) que la carapace.

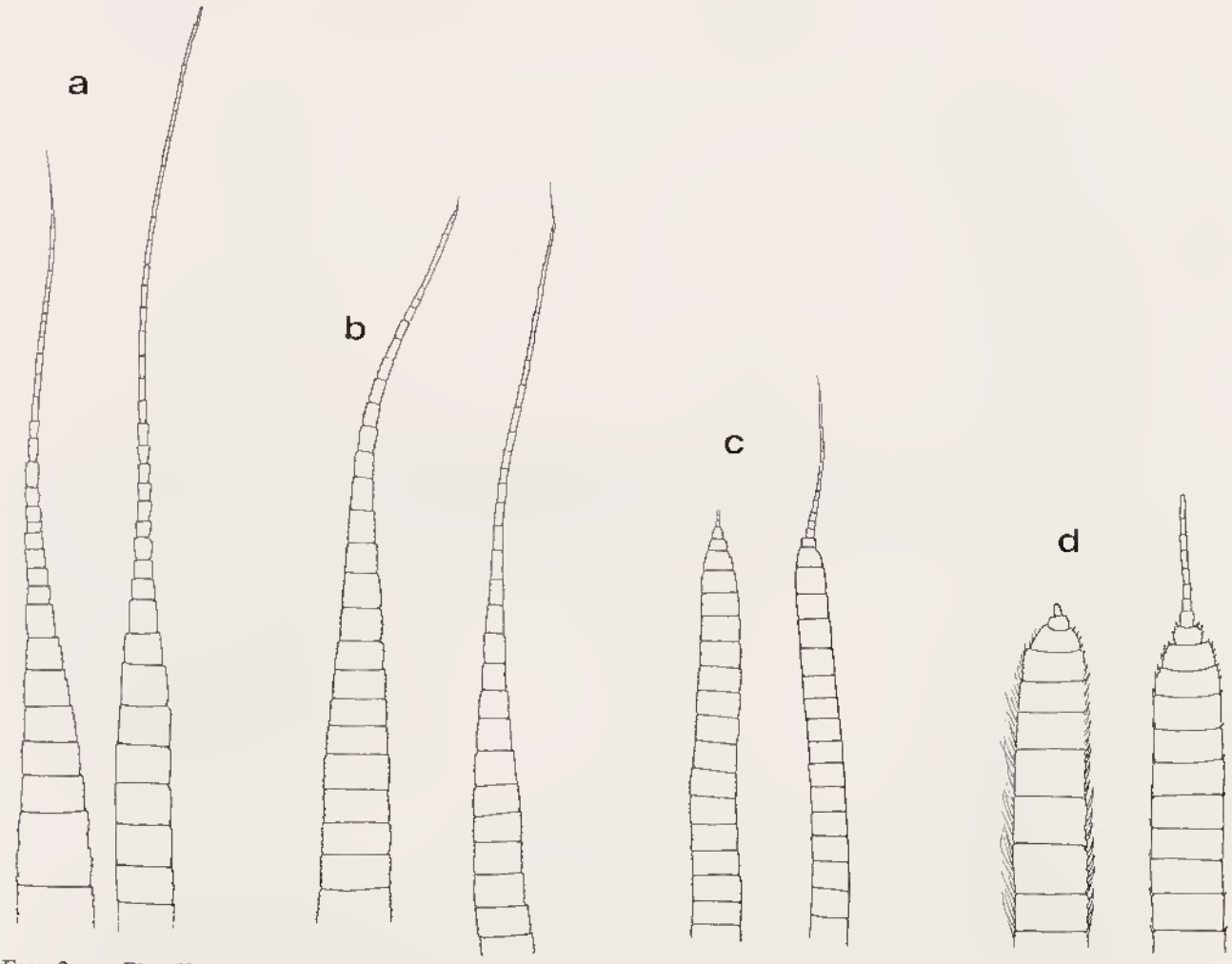

FIG. 2. — Flagelles antennulaires gauches : **a**, *Solenocera barunajava* sp. nov., ♀ holotype 29,5 mm, Indonésie, KARUBAR, st. CP 83, 285-297 m (MNHN-Na 12920). — **b**, *Solenocera annectens* (Wood Mason, 1891), ♀ 17,5 mm, Indonésie, KARUBAR, st. CP 12, 413-436 m (MNHN-Na 12923). — **c**, *Solenocera moosai* Crosnier, 1985, ♂ holotype 17,0 mm, Indonésie, CORINDON 2, st. 273, 1°56,0'S, 119°16,0'E, 120-200 m (MNHN-Na 9032). — **d**, *Solenocera faxoni* de Man, 1907, ♀ 20,5 mm, Australie, Marian plateau, *"Soela"*, cruise 685, st. 23, 20°49,75'S, 152°20,60'E, 314-319 m, 21.11.85.

Le scaphocérite a l'épine distale de son bord externe qui se termine au même niveau que la lame.

Les troisièmes maxillipèdes dépassent le scaphocérite par une longueur de leur dactyle comprise entre les deux tiers et la longueur totale de cet article.

Les premiers péréiopodes dépassent la base du scaphocérite de la longueur de leur propode; leur basis et leur ischion sont armés d'une longue épine. Les deuxièmes péréiopodes ne portent une épine que sur leur basis; ils s'étendent jusqu'aux trois quarts du scaphocérite. Les autres péreiopodes sont dépourvus d'épines. Les troisièmes

Source : MNHN, Paris

dépassent le scaphocérite par une longueur de leur propode comprise entre la moitié et les trois quarts de celui-ci. Les quatrièmes atteignent les sept dixièmes environ du scaphocérite et les cinquièmes le dépassent par tout leur dactyle et un sixième environ de leur propode.

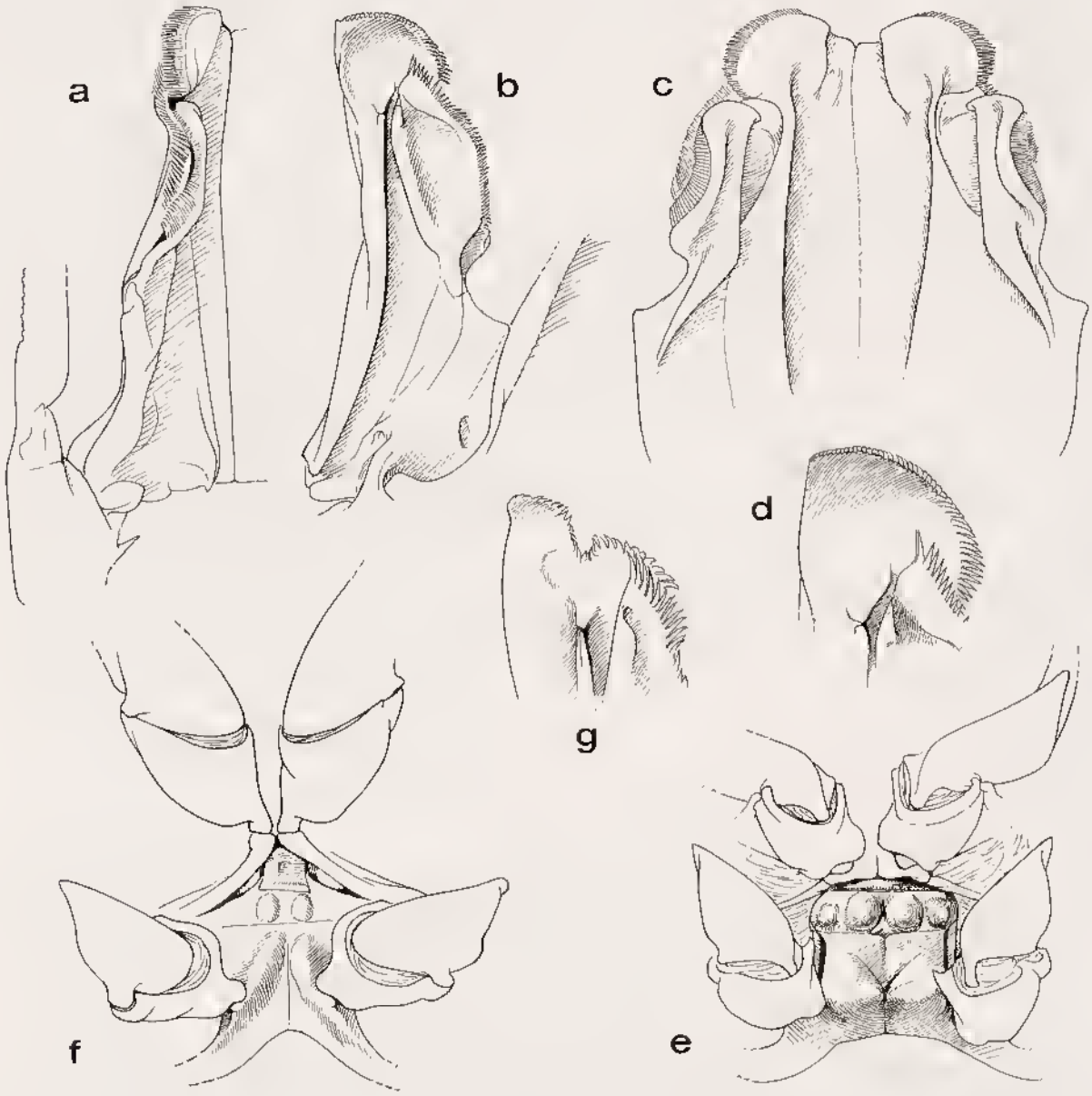

FIG. 3 a-d. — *Solenocera barunajaya* sp. nov., ♂ allotype 19,5 mm, Indonésie, KARUBAR, st. CP 83, 285-297 m (MNHN-Na 12920). Pétasma : **a**, moitié droite, vue ventrale; **b**, *idem*, vue latérale; **c**, deux tiers distaux étalés, vue ventrale; **d**, partie distale de la moitié droite, vue latérale.

FIG. 3 e. — *Solenocera barunajaya* sp. nov., ♀ paratype 25,1 mm, Indonésie, KARUBAR, st. CP 79, 239-250 m, (MNHN-Na 12921) : vue ventrale des sternites thoraciques VII et VIII, soies enlevées.

FIG. 3 f. — *Solenocera faxoni* de Man, 1907, ♀ 22,0 mm, Australie, S. E. Queensland, 27°58'S, 153°51,5'E, 183 m, 28.07.1982 (MNHN-Na 12924) : vue ventrale des sternites thoraciques VII et VIII, soies enlevées.

FIG. 3 g. — *Solenocera moosai* Crosnier, 1985, ♂ 13,3 mm, Philippines, MUSORSTOM 3, st. CP 103, 14°00,4'N, 120°18,15'E, 193-200 m (MNHN-Na 9580) : partie distale de la moitié droite du pétasma, vue latérale.

Source : MNHN, Paris

Premier et deuxième segments abdominaux sans carène dorsale (un renflement longitudinal dorsal peut s'observer sur le deuxième segment de certains spécimens, mais il ne peut jamais être qualifié de carène). La longueur dorsale médiane du second est égale à 3,5 fois celle du premier. Troisième segment abdominal avec une forte carène dorsale s'étendant sur toute la longueur de la partie du segment ne pouvant être recouverte par le deuxième segment. Carène des segments suivants bien développée, en lame de couteau. Carène des troisième, quatrième et cinquième segments se terminant par une profonde fissure dans laquelle vient s'engager la carène du segment suivant. Carène du sixième segment se terminant par une forte épine. Bords inférieurs du sixième segment avec une petite dent subdistale. Sternites abdominaux avec une dent entre chaque paire de pléopodes.

Telson 1,3 fois plus long que le sixième segment (mesuré du condyle d'articulation au lobe médian du bord postérieur), légèrement plus long que la rame interne de l'uropode et à peine plus court que la rame externe. Bord externe de la rame externe de l'uropode se terminant par un denticule. Face dorsale du telson creusée en gouttière dans sa partie antérieure puis convexe postérieurement; une paire de fortes épines fixes, latérales, s'observe aux sept dixièmes de la longueur du telson.

Le thélycum présente, sur la partie antérieure du sternite thoracique VIII, une rangée transversale de 4 tubercules arrondis : deux gros médians, flanqués chacun, extérieurement, d'un plus petit (fig. 3 e), couverts de soies qui les dissimulent. La partie postérieure du sternite VIII est trapézoïdale; sa partie postérieure présente deux fortes dents, séparées par un sillon longitudinal, qui, larges, ferment le thélycum postérieurement; ces dents se prolongent vers l'avant par deux racines qui délimitent une aire triangulaire (la base vers l'avant), lisse et déprimée.

Le pétasma (fig. 3 a-d) a ses lobules ventromédians, dorsolatéraux et ventrolatéraux fortement pectinés. Les lobules dorsomédians sont peu développés, inermes, et ne dépassent pas les lobules ventromédians. Ces derniers ont leurs bords antérieurs et ventraux qui forment une courbe régulière et portent une quarantaine de fortes soies de taille voisine, sauf dans les parties distales où elles sont plus courtes. Les lobules dorsolatéraux portent de 45 à 55 fortes soies, de taille voisine, sauf dans la partie distale antérieure où elles sont nettement plus grandes et dans la partie distale postérieure où leur taille diminue. Les lobules ventrolatéraux portent, sur toute la longueur de leur bord externe, un peigne de soies très serrées et ce d'autant plus que, contrairement à celles des lobules précédents, les soies des lobules ventrolatéraux ne s'amincissent pas dans leur partie distale. Le lobule accessoire se réduit à un petit lobe se prolongeant en pointe.

REMARQUES. — Par la forme du lobe branchiostège formé par la partie antérieure de la carène hépatique et par sa région hépatique fortement renflée, *Solenocera barunajaya* fait penser à *S. moosai* Crosnier, 1985, et *S. faxoni* de Man, 1907.

Elle se distingue toutefois facilement de *S. moosai* par :

— la présence, habituellement, de 6 dents rostrales et postrostrales (sans compter l'épigastrique) et non de 5.

— des flagelles antennulaires plus courts (=1,05 fois la longueur de la carapace contre 1,4 à 1,65 pour *S. moosai*) et se terminant tous deux en long filament (tandis que l'inférieur est dépourvu de filament chez *S. moosai*. Comparez les figures 2 a et 2 c).

— un premier segment abdominal plus long dorsalement, compris environ 3,5 fois dans la longueur dorsale du second (au lieu d'environ 8 fois chez *S. moosai*. Comparez les figures 1 c et 1 f).

— un thélycum chez lequel la partie antérieure du sternite thoracique VIII porte quatre protubérances (au lieu de deux) et dont la partie postérieure du sternite thoracique VIII présente une zone centrale concave (au lieu d'être renflée). Comparez la figure 1 e à la figure 6 a de CROSNIER, 1985.

— un pétasma dont les lobules ventromédians sont entiers et régulièrement arrondis (au lieu d'être bilobés) et dont le lobule accessoire est formé par un lobule pointu (au lieu d'un repli membraneux). Comparez les figures 1 d et 1 g.

Solenocera barunajaya se distingue de *S. faxoni* par :

— la présence d'une carène dorsale très bien marquée sur le troisième segment abdominal (totalement absente chez *S. faxoni*).

— un rostre plus long. Comparez les figures 1 a et 1 d.

— des yeux de taille normale (nettement petits chez *S. faxoni*, cf. fig. 1 d).

Source : MNHN, Paris

— des flagelles antennulaires un peu plus courts (= 1,05 fois la longueur de la carapace contre environ 1,20) et se terminant tous deux en long filament (alors que chez *S. faxoni*, seul le flagelle supérieur se termine en filament. Comparez les figures 2 a et 2 d).

— un thélycum dont les protubérances de la partie antérieure du sternite thoracique VIII, au nombre de quatre, sont plus développées (le thélycum de *S. faxoni* ne présente que deux petits tubercules dans sa partie antérieure) et dont la partie postérieure du sternite VIII est assez dissemblable de celle de *S. faxoni*. Comparez les figures 1 e et 1 f).

— un pétasma dont le lobule accessoire est petit et pointu (au lieu d'être assez développé et arrondi, cf. CROSNIER, 1985, fig. 7 e) et dont les soies des lobules dorsolatéraux et ventrolatéraux sont nettement plus développées.

Solenocera barunajaya est également proche de *S. annectens* (Wood Mason, 1891) avec laquelle elle pourrait à la rigueur être confondue. Elle s'en rapproche en effet par la forme du lobe branchiostège (cf. CROSNIER, 1985, fig. 5 c), les extrémités des flagelles antennulaires, la forme du thélycum (cf. CROSNIER, 1985, fig. 6 c-d) et celle du pétasma (cf. CROSNIER, 1985, fig. 7 f-g).

Solenocera annectens peut toutefois se distinguer sans problème par :

— le rostre nettement plus long, à bord inférieur moins convexe et portant le plus souvent 7 dents (au lieu de 6), sans compter l'épigastrique.

— la présence d'une dent orbitaire bien marquée (absente chez *S. barunajaya*).

— l'extrémité du lobe branchiostège peu pointue.

— des flagelles antennulaires plus longs (= environ 1,3 fois la longueur de la carapace contre 1,05).

— le pétasma dont le lobule accessoire est plus développé que chez *S. barunajaya* et arrondi (au lieu d'être pointu). Voir CROSNIER, 1985, fig. 7 f.

ETYMOLOGIE. — Cette espèce est nommée d'après le navire *"Baruna Jaya I"* avec lequel a été effectuée toute la campagne KARUBAR.

DISTRIBUTION. — L'espèce est connue de l'est de l'Indonésie (îles Kai et Tanimbar) et du nord de l'Australie (mer de Timor), entre 240 et 360 m de profondeur environ.

Famille PENAEIDAE

Atypopenaeus dearmatus de Man, 1907

Station CP 63, 214-215 m.

Funchalia taaningi Burkenroad, 1940

Station CP 90, 897-913 m.

Metapenaeopsis liui Crosnier, 1987

Stations CP 05, 296-299 m. — CP 06, 287-298 m. — CP 09, 368-389 m. — CP 25, 336-346 m. — CP 33, 307-311 m. — CP 35, 390-502 m. — CP 45, 302-305 m. — CP 47, 235-246 m. — CP 78, 284-295 m. — CP 79, 239-250 m. — CP 81, 200-207 m. — CP 82, 215-219 m. — CP 84, 246-275 m.

Répartition bathymétrique : 200 à 400 m environ.

Metapenaeopsis philippii (Bate, 1881)

Stations CP 05, 296-299 m. — CP 16, 315-349 m. — CP 65, 176-174 m. — CP 66, 211-217 m. — CP 81, 200-207 m. — CP 82, 215-219 m.

Répartition bathymétrique : 175-220 m.

Source : MNHN, Paris

Metapenaeopsis provocatoria longirostris Crosnier, 1987
Stations CP 47, 235-246 m. — CP 62, 246-253 m. — CP 63, 214-215 m. — CP 66, 211-217 m. — CP 79, 239-250 m. — CP 82, 215-219 m. — CP 85, 240-245 m.

Répartition bathymétrique : 210 à 250 m.

Miyadella ornata Holthuis, 1955
Station CP 78, 289-295 m.

Parapenaeus fissurus (Bate, 1881)
Stations DW 15, 212-221 m. — CP 82, 215-219 m. — CP 84, 246-275 m. — CP 85, 240-245 m.

Parapenaeus investigatoris Alcock & Anderson, 1899
Stations CC 10, 329-389 m. — CP 35, 390-502 m. — CC 42, 350-354 m. — CP 45, 302-305 m. — CP 62, 246-253 m. — CP 69, 356-368 m. — CP 77, 346-352 m. — CP 78, 284-295 m. — CP 79, 239-250 m. — CP 83, 285-297 m. — CP 84, 246-275 m. — CP 85, 240-245 m.

Parapenaeus lanceolatus Kubo, 1949
Stations CP 47, 235-246 m. — CP 62, 246-253 m. — CP 63, 214-215 m. — CP 65, 174-176 m. — CP 66, 211-217 m. — CP 79, 239-250 m. — CP 84, 246-275 m. — CP 85, 240-245 m.

Parapenaeus murrayi Ramadan, 1938
Station CP 36, 210-268 m.

Penaeopsis eduardoi Pérez Farfante, 1977
Stations CP 06, 287-298 m. — CP 09, 368-389 m. — CC 10, 329-389 m. — CP 16, 315-349 m. — CP 25, 336-346 m. — CP 33, 307-311 m. — CP 37, 241-363 m. — CC 41, 393-401 m. — CP 45, 302-305 m. — CP 59, 399-405 m. — CP 69, 356-368 m. — CP 70, 410-413 m. — CP 75, 451-452 m. — CP 77, 346-352 m. — CP 78, 284-295 m. — CP 83, 285-297 m.

Penaeopsis rectacuta (Bate, 1881)
Stations CC 10, 329-389 m. — CP 33, 307-311 m. — CP 35, 390-502 m. — CP 45, 302-305 m. — CP 62, 246-253 m. — CP 69, 356-368 m. — CP 77, 346-352 m. — CP 78, 284-295 m. — CP 83, 285-297 m.

Famille SICYONIIDAE

Sicyonia benthophila de Man, 1907
Station CP 78, 289-295 m.

Sicyonia curvirostris Balss, 1914
Station DW 18, 205-212 m.

Sicyonia fallax de Man, 1907
Station DW 03, 278-301 m.

Sicyonia inflexa Kubo, 1949
Stations DW 13, 417-425 m. — CP 19, 576-605 m. — CP 20, 769-809 m. — CP 35, 390-502 m. — CP 38, 620-666 m. — CC 40, 443-468 m.

Sicyonia nebulosa Kubo, 1949
Stations DW 01, 156-305 m. — CP 35, 390-502 m.

Source : MNHN, Paris

C'est au total 37 espèces de crevettes pénéides d'eau profonde qui ont été récoltées lors de la campagne KARUBAR. C'est là un nombre peu élevé qui peut s'expliquer, au moins en partie, par les fonds souvent durs, peu appréciés des crevettes pénéides, sur lesquels nous avons travaillé.

Parmi ces espèces, une seule est nouvelle, *Solenocera barunajaya*. Sa description nous a amené à revoir une autre espèce découverte en Indonésie par la *"Siboga"*, mais non retrouvée par le *"Baruna Jaya I"*, *Solenocera faxoni* de Man, 1907, espèce qui n'avait pas encore été entièrement figurée.

Aucune des récoltes faites n'apporte de réelle surprise quant à la répartition géographique des espèces. Toutes étaient déjà connues d'Indonésie ou bien de régions voisines (Philippines notamment), à l'exception semble-t-il de *Sicyonia curvirostris* Balss (connue toutefois du Japon à la mer de Chine méridionale) et de *S. nebulosa* Kubo (connue, ne semble-t-il, que du Japon). Ceci joint à la découverte d'une seule espèce nouvelle montre bien que la faune bathyale de cette région, en ce qui concerne les crustacés décapodes, commence à être bien connue. Ceci est encore corroboré par le tout récent travail de TAKEDA et HANAMURA (1994) sur les récoltes du *"Hakuho-Maru"*, où sont citées 13 espèces de crevettes pénéides d'eau profonde dont une seule, *Sicyonia truncata* (Kubo, 1949) est nouvelle pour l'Indonésie.

REMERCIEMENTS

Bertrand RICHER DE FORGES a préparé les cartes (fig. 4-6) de ce travail. Nous tenons en l'en remercier ici.

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ANNEXE

Liste des stations de la campagne KARUBAR

Les majuscules se trouvant avant le numéro de la station indiquent l'engin utilisé : DW : Drague Waren; ED : drague épibenthique; CP : chalut à perche; CC : chalut à panneaux (crevettes)

N° station	Date (1991)	Heure locale (engin au fond)	Profondeur	Latitude	Longitude
Iles Kai					
DW 01	22.10	8h09	156-305 m	05°46'S	132°10'E
DW 02	22.10	10h10	209-240 m	05°47'S	132°13'E
DW 03	22.10	11h33	301-278 m	05°48'S	132°13'E
CP 04	22.10	13h35	335-347 m	05°50'S	132°16'E
CP 05	22.10	15h00	296-299 m	05°49'S	132°18'E
CP 06	22.10	18h00	298-287 m	05°49'S	132°21'E

Source : MNHN, Paris

N° station	Date (1991)	Heure locale (engin au fond)	Profondeur	Latitude	Longitude
Iles Kai					
DW 07	22.10	19h53	283-285 m	05°46'S	132°21'E
DW 08	23.10	6h52	358-360 m	05°20'S	132°31'E
CP 09	23.10	8h18	368-389 m	05°23'S	132°29'E
CC 10	23.10	10h55	329-389 m	05°21'S	132°30'E
ED 11	23.10	14h45	368-360 m	05°23'S	132°30'E
CP 12	23.10	19h43	436-413 m	05°23'S	132°37'E
DW 13	24.10	7h33	417-425 m	05°26'S	132°38'E
DW 14	24.10	10h03	245-246 m	05°18'S	132°38'E
DW 15	24.10	11h28	212-221 m	05°17'S	132°41'E
CP 16	24.10	14h11	315-349 m	05°17'S	132°50'E
CP 17	24.10	18h07	459-439 m	05°15'S	133°01'E
DW 18	24.10	20h22	205-212 m	05°18'S	133°01'E
CP 19	25.10	6h40	605-576 m	05°15'S	133°01'E
CP 20	25.10	9h53	769-809 m	05°15'S	132°59'E
CC 21	25.10	13h45	688-694 m	05°14'S	133°00'E
DW 22	25.10	16h50	124-850 m	05°22'S	133°01'E
ED 23	25.10	18h45	538-546 m	05°25'S	132°57'E
DW 24	26.10	6h10	243-230 m	05°32'S	132°51'E
CP 25	26.10	7h32	336-346 m	05°30'S	132°52'E
CP 26	26.10	9h05	265-302 m	05°34'S	132°52'E
CP 27	26.10	10h15	304-314 m	05°33'S	132°51'E
DW 28	26.10	11h58	448-467 m	05°31'S	132°54'E
DW 29	26.10	13h53	181-184 m	05°36'S	132°56'E
DW 30	26.10	14h50	118-111 m	05°39'S	132°56'E
DW 31	26.10	16h48	288-289 m	05°40'S	132°51'E
DW 32	26.10	18h30	170-206 m	05°47'S	132°51'E
CP 33	27.10	8h18	307-311 m	06°05'S	132°38'E
CP 34	27.10	11h28	435-445 m	06°09'S	132°41'E
CP 35	27.10	13h32	390-502 m	06°08'S	132°45'E
CP 36	27.10	16h58	268-210 m	06°05'S	132°44'E
CP 37	27.10	19h00	363-241 m	06°07'S	132°42'E
CP 38	28.10	7h04	620-666 m	07°40'S	132°27'E
CP 39	28.10	9h59	477-466 m	07°47'S	132°26'E
CC 40	28.10	12h42	443-468 m	07°46'S	132°31'E
Iles Tanimbar					
CC 41	28.10	15h53	401-393 m	07°45'S	132°42'E
CC 42	28.10	19h20	354-350 m	07°53'S	132°42'E
ED 43	29.10	6h02	290-283 m	07°52'S	132°50'E
DW 44	29.10	7h35	291-295 m	07°52'S	132°48'E
CP 45	29.10	8h53	302-305 m	07°54'S	132°47'E
CP 46	29.10	10h58	271-273 m	08°01'S	132°51'E
CP 47	29.10	12h15	246-235 m	08°01'S	132°55'E
CP 48	29.10	13h35	223-218 m	08°00'S	132°58'E
DW 49	29.10	14h43	210-206 m	08°00'S	132°59'E
DW 50	29.10	15h58	184-186 m	07°59'S	133°02'E
CP 51	29.10	17h50	255-270 m	07°59'S	132°50'E
CP 52	30.10	8h02	1244-1266 m	08°03'S	131°48'E
CP 53	30.10	12h20	1026-1053 m	08°18'S	131°41'E

Source : MNHN, Paris

N° station	Date (1991)	Heure locale (engin au fond)	Profondeur	Latitude	Longitude
Iles Tanimbar					
CP 54	30.10	16h11	836-869 m	08°21'S	131°43'E
ED 55	30.10	19h30	854-852 m	08°16'S	131°47'E
CC 56	31.10	6h30	552-549 m	08°16'S	131°59'E
CC 57	31.10	9h56	603-620 m	08°19'S	131°53'E
CC 58	31.10	13h48	457-461 m	08°19'S	132°02'E
CP 59	31.10	17h03	405-399 m	08°20'S	132°11'E
DW 60	31.10	18h43	389-387 m	08°21'S	132°14'E
DW 61	01.11	5h24	236-235 m	09°05'S	132°44'E
CP 62	01.11	6h32	246-253 m	09°01'S	132°42'E
CP 63	01.11	9h24	215-214 m	08°00'S	132°58'E
DW 64	01.11	13h28	180-179 m	09°13'S	132°31'E
CP 65	01.11	14h16	176-174 m	09°14'S	132°27'E
CP 66	01.11	17h07	211-217 m	09°01'S	132°09'E
CP 67	01.11	18h23	233-146 m	08°58'S	132°06'E
ED 68	01.11	19h55	280-296 m	08°54'S	132°01'E
CP 69	02.11	6h35	356-368 m	08°42'S	131°53'E
CP 70	02.11	9h10	413-410 m	08°41'S	131°47'E
CP 71	02.11	11h48	477-480 m	08°38'S	131°44'E
CP 72	02.11	15h16	699-676 m	08°36'S	131°33'E
CP 73	02.11	19h00	855-840 m	08°29'S	131°33'E
CC 74	03.11	5h45	520-518 m	08°44'S	131°31'E
CP 75	03.11	8h45	452-451 m	08°46'S	131°36'E
CP 76	03.11	11h06	401-400 m	08°50'S	131°33'E
CP 77	03.11	13h29	352-346 m	08°57'S	131°27'E
CP 78	03.11	15h47	295-284 m	09°06'S	131°24'E
CP 79	03.11	18h09	250-239 m	09°16'S	131°22'E
DW 80	04.11	6h03	199-201 m	09°37'S	131°02'E
CP 81	04.11	7h20	200-207 m	09°35'S	131°02'E
CP 82	04.11	10h26	219-215 m	09°32'S	131°02'E
CP 83	04.11	13h01	285-297 m	09°23'S	131°00'E
CP 84	04.11	15h13	275-246 m	09°23'S	131°09'E
CP 85	04.11	16h42	245-240 m	09°22'S	131°14'E
CP 86	04.11	18h16	225-223 m	09°26'S	131°13'E
CP 87	05.11	6h53	1017-1024 m	08°47'S	130°49'E
CP 88	05.11	9h31	1188-1178 m	08°45'S	130°47'E
CP 89	05.11	14h04	1084-1058 m	08°39'S	131°08'E
CP 90	05.11	17h19	913-897 m	08°44'S	131°03'E
CP 91	05.11	20h03	884-891 m	08°44'S	131°05'E

Source : MNHN, Paris

FIG. 4. — Zones (hachurées) prospectées lors de la campagne KARUBAR.

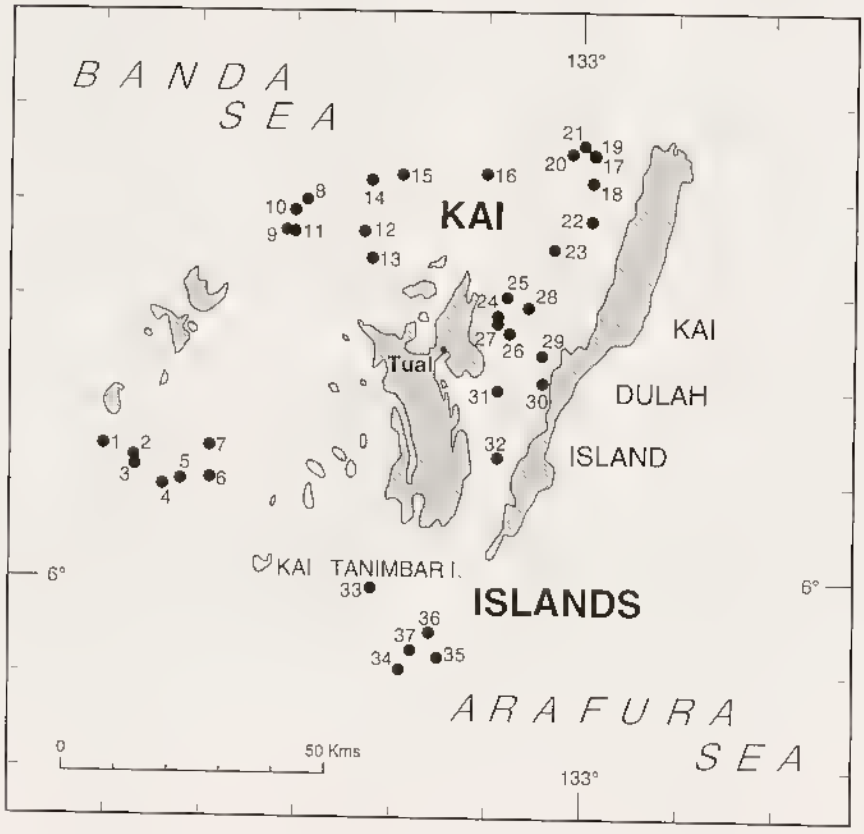

FIG. 5. — Positions des stations effectuées autour des îles Kai lors de la campagne KARUBAR.

Source : MNHN, Paris

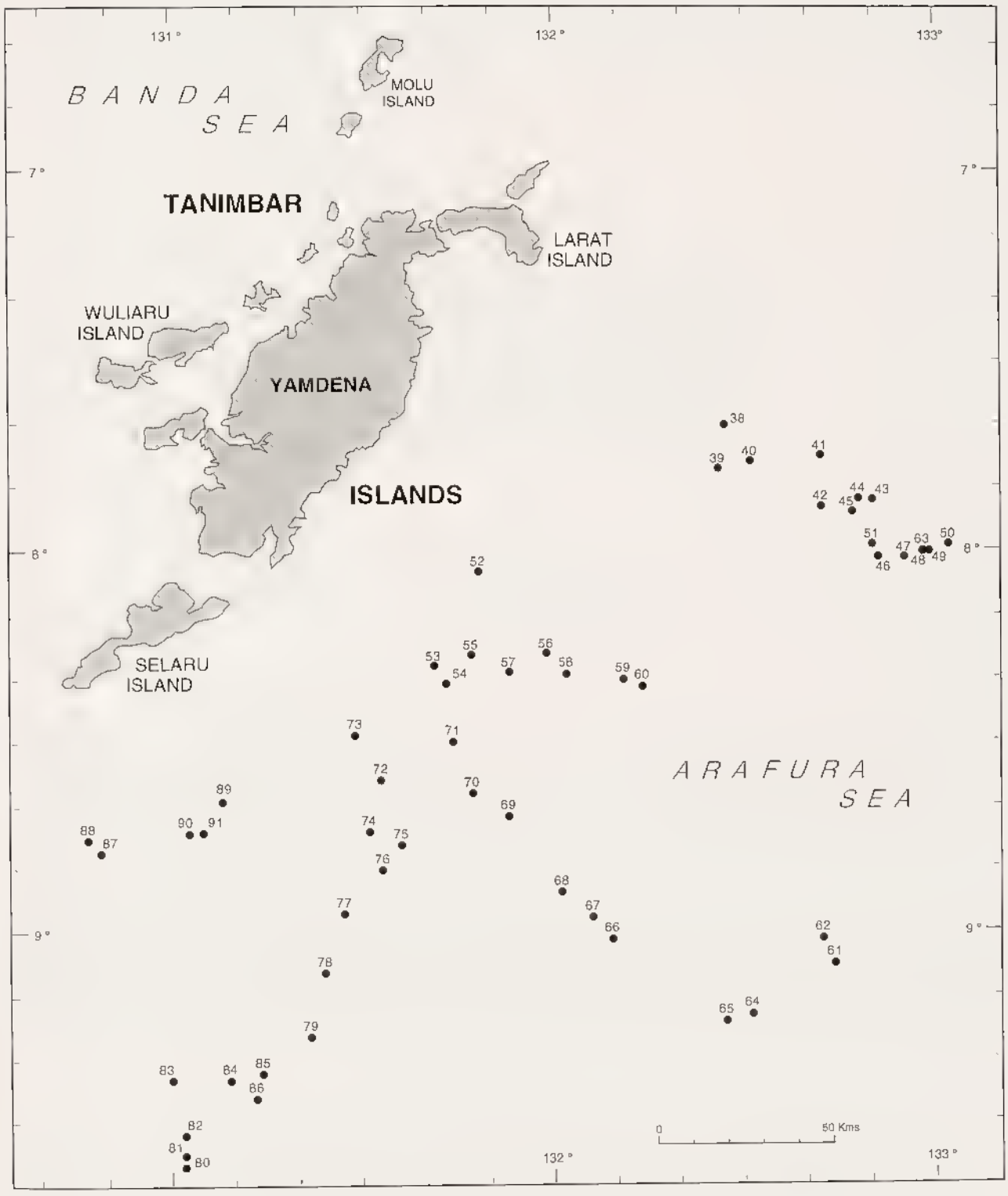

FIG. 6. — Positions des stations effectuées autour des îles Tanimbar lors de la campagne KARUBAR.

Source : MNHN, Paris

Source : MNHN, Paris

Crustacea Decapoda : Penaeoidea à l'exclusion des Sicyoniidae récoltés dans la zone économique des îles Wallis et Futuna lors de la campagne MUSORSTOM 7

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RÉSUMÉ

Lors de la campagne MUSORSTOM 7, effectuée dans la zone économique des îles Wallis et Futuna et surtout consacrée à des recherches sur la faune d'eau profonde, 26 espèces de crevettes pénéides appartenant aux familles des Benthesicymidae, des Aristaeidae et des Penaeidae ont été récoltées. Seules cinq d'entre elles avaient déjà été signalées de la région (plus exactement des îles Fidji proches) et la plupart des espèces voient leur aire de répartition considérablement agrandie.

ABSTRACT

Crustacea Decapoda : Penaeoidea, Sicyoniidae excluded, collected in the economic zone of the Wallis and Futuna Islands during the MUSORSTOM 7 cruise.

During the MUSORSTOM 7 cruise, carried out in the economic zone of the Wallis and Futuna Islands and mainly devoted to the deepwater fauna, 26 species of penaeid shrimps belonging to the families Benthesicymidae, Aristaeidae and Penaeidae were collected. Only five of these had previously been recorded from the region (more exactly from the nearby Fiji Islands) and most of the species have had their known distribution ranges considerably extended.

La campagne MUSORSTOM 7 s'est déroulée, du 5 mai au 4 juin 1992, dans la zone économique des îles Wallis et Futuna. Cent quarante-cinq dragages et chalutages, à des profondeurs comprises entre 100 et 1300 m, plus quatre chalutages dans les eaux du lagon de l'île Wallis, entre 45 et 55 m, y ont été effectués. Vingt-six espèces de crevettes pénéides, à l'exclusion des Sicyoniidae qui seront étudiées dans le cadre d'une révision en cours des espèces indo-ouest-pacifiques de la famille, ont été récoltées. Aucune n'est nouvelle. Compte tenu, toutefois, de la

CROSNIER, A., 1994. — Crustacea Decapoda : Penaeoidea, à l'exclusion des Sicyoniidae, récoltés dans la zone économique des îles Wallis et Futuna, lors de la campagne MUSORSTOM 7. *In* : A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Volume 12. *Mém. Mus. natn. Hist. nat.*, **161** : 367-373. Paris ISBN 2-85653-212-8.

Source : MNHN, Paris

position géographique des îles Wallis et Futuna, proches des îles Fidji à l'ouest et des Samoa à l'est, et situées à mi-chemin environ entre la Nouvelle-Calédonie et les îles de la Société, il nous a semblé intéressant, au plan biogéographique, de donner ici la liste des espèces capturées.

Ceci nous paraît d'autant plus valable que nous ne possédons que peu de renseignements sur les crevettes pénéides de cette région.

En ce qui concerne les Fidji, BATE (1881, 1888) a signalé, souvent sous des identifications erronées :

Benthesicymus investigatoris Alcock & Anderson, 1899 (sous *B. altus* Bate, 1881, en partie, voir CROSNIER, 1985),

Benthesicymus iridescens Bate, 1881 (sous *B. brasiliensis* Bate, 1881, en partie, voir BURKENROAD, 1936),

Aristaeomorpha foliacea (Risso, 1827) (sous *Aristeus rostridentatus* Bate, 1881),

Penaeopsis challengeri de Man, 1911 (sous *Penaeus serratus* Bate, 1881, en partie),

Penaeopsis eduardoi Pérez Farfante, 1977 (sous *Penaeus serratus* Bate, 1881, en partie, et sous *Penaeus serratus* Bate, 1881, en partie également, voir PÉREZ FARFANTE, 1980),

Penaeus canaliculatus Olivier, 1811.

MIQUEL (1982) cite :

Metapenaeus anchistus (de Man, 1920),

Metapenaeus elegans (de Man, 1907).

CHOY (1983) signale :

Metapenaeus anchistus (de Man, 1920), à nouveau,
Metapenaeus elegans (de Man, 1907), à nouveau,
Metapenaeus ensis (de Haan, 1844),
Penaeus canaliculatus Olivier, 1811, à nouveau,
Penaeus latisulcatus Kishinouye, 1900,
Penaeus merguiensis de Man, 1888,
Penaeus monodon Fabricius 1798,
Penaeus semisulcatus de Haan, 1844.

Enfin, KING (1984) a mentionné :

Aristeus virilis Bate, 1881,
Parapenaeus fissurus (Bate, 1881),
Penaeopsis eduardoi Pérez Farfante, 1977, à nouveau.

En ce qui concerne les Samoa, nous n'avons trouvé aucune mention de crevettes pénéides identifiées.

Comme on le verra, plusieurs espèces voient, à la suite des récoltes faites lors de MUSORSTOM 7, leur aire d'extension connue considérablement augmentée.

Afin d'être le plus bref possible, nous ne donnons ci-après, pour chaque espèce, que les numéros des stations de récolte et leur profondeur. Le lecteur, qui souhaiterait plus de détails, pourra se reporter au compte rendu de la campagne MUSORSTOM 7 publié par B. RICHER DE FORGES et J.-L. MENOU (1993).

Famille BENTHESICYMIDAE

Benthesicymus investigatoris Alcock & Anderson, 1891

Stations CP 521, 890-915 m. — CP 550, 800-810 m. — CP 551, 791-795 m. — CP 552, 786-800 m. — CC 553, 780-794 m. — CP 562, 775 m. — CP 564, 1015-1020 m. — CP 565, 900 m. — CP 567, 1010-1020 m. — CP 592, 730-775 m. — CP 621, 1280-1300 m. — CP 622, 1280-1300 m. — CP 638, 820-840 m.

NOTE : les captures ont été parfois abondantes (plusieurs dizaines de spécimens en une même station).

Benthonectes filipes Smith, 1885, (figure 1)

Station DW 637, 820-830 m.

Source : MNHN, Paris

Gennadas capensis Calman, 1925
Station DW 620, 1280 m.

Gennadas propinquus Rathbun, 1906
Station DW 620, 1280 m.

Gennadas scutatus Bouvier, 1906
Station CP 623, 1280-1300 m.

Famille ARISTAEIDAE

Aristaeomorpha foliacea (Risso, 1827)
Stations CP 627, 597-600 m. — CP 632, 595-600 m.

Aristeus mabahissae Ramadan, 1938
Stations CP 550, 800-810 m. — CP 562, 775 m. — CP 592, 730-775 m.
NOTE : Le nombre des photophores des périopodes de ces spécimens, au nombre de 6, demeurés très visibles, ont été relevés. Les limites de variation observées sont données dans le tableau ci-après :

	P1	P2	P3	P4	P5
Carpe	7 à 9	2 à 3	1 à 7	7 à 9	5 à 9
Propode	1 à 2	1 à 2	0 à 1	8 à 11	9 à 13
Dactyle	0	0	0	0	4 à 6

Ces nombres correspondent bien avec ceux observés sur les *Aristeus mabahissae* de la région malgache (CROSNIER, 1978 : 64, tabl. 4).

Hemipenaeus carpenteri Wood Mason, 1891, (figure 5)
Stations CP 564, 1015-1020 m. — CP 565, 900 m. — CP 567, 1010-1020 m.

Hepomadus tener Smith, 1884
Station CP 622, 1280-1300 m.

Plesiopenaeus armatus (Bate, 1881)
Stations CP 567, 1010-1020 m. — CP 621, 1280-1300 m. — CP 623, 1280-1300 m.

Plesiopenaeus edwardsianus (Johnson, 1867)
Station CP 562, 775 m.

Famille SOLENOCERIDAE

Hadropenaeus lucasi (Bate, 1881), (figures 3 et 4)
Stations DW 496, 250-330 m. — CP 505, 245-400 m. — CP 506, 245-400 m. — CP 508, 245-440 m. — DW 529, 500 m. — DW 555, 540 m. — CP 559, 547-552 m. — DW 594, 495-505 m. — CP 606, 420-430 m. — CP 627, 597-600 m. — CP 629, 400-420 m. — CP 632, 595-600 m.

Hymenopenaeus equalis (Bate, 1888)
Stations CP 627, 597-600 m. — CP 628, 625-650 m. — CP 631, 600 m. — CP 632, 595-600 m.

Hymenopenaeus halli Bruce, 1966
Stations DW 547, 455 m. — CP 550, 800-810 m. — CP 551, 791-795 m. — CP 552, 786-800 m. — CP 562, 775 m. — CP 592, 730-775 m. — CP 593, 705-711 m. — DW 627, 597-600 m. — CP 628, 625-650 m. — CP 631, 600 m. — CP 632, 595-600 m.

Source : MNHN, Paris

Hymenopenaeus neptunus (Bate, 1881)
Stations CP 550, 800-810 m. — CP 564 m, 1015-1020 m. — CP 565, 900 m. — CP 621, 1280-1300 m. — CP 622, 1280-1300 m. — CP 623, 1280-1300 m.

Hymenopenaeus propinquus (de Man, 1907)
Stations DW 547, 455 m. — DW 548, 700-740 m. — CP 550, 800-810 m. — CP 551, 791-795 m. — CP 552, 786-800 m. — CP 562, 775 m. — CP 565, 900 m.

Mesopenaeus mariae Pérez Farfante & Ivanov, 1982
Stations CP 515, 224-252 m. — CP 517, 235 m.
NOTE : quatre spécimens, trois femelles et un mâle juvénile récoltés.

Cryptopenaeus clevai Crosnier, 1984, (figure 2)
Station CP 629, 400-420 m.
NOTE : un seul spécimen, femelle, récolté.

Solenocera pectinata (Bale, 1888), (figure 7)
Station lagon sud Wallis, 45 m.

Solenocera rathbuni Ramadan, 1938, (figure 6)
Station DW 508, 245-440 m.

Famille PENAEIDAE

Metapenaeopsis difficilis Crosnier, 1991, (figure 8)
Stations CP 498, 105-160 m. — DW 508, 245-440 m.

Metapenaeopsis distincta (de Man, 1907)
Station lagon sud Wallis, 52-55 m.

Metapenaeopsis provocatoria Racek & Dall, 1965
Stations CP 505, 245-400 m. — CP 508, 245-440 m.

Metapenaeus anchistus (de Man, 1920)
Station lagon sud Wallis, 52-55 m.

Parapenaeus fissurus (Bate, 1881)
Station DW 504, 300-390 m.

Penaeopsis challengeri de Man, 1911
Stations DW 526, 355-360. — CP 552, 786-800 m. — DW 606, 420-430 m. — CP 609, 430 m. — DW 629, 400-420 m.

Sur les 26 espèces qui viennent d'être citées, seules cinq : *Benthesicymus investigatoris*, *Aristaeomorpha foliacea*, *Metapenaeus anchistus*, *Parapenaeus fissurus* et *Penaeopsis challengeri*, avaient déjà été signalées dans cette région (des îles Fidji).

Penaeopsis challengeri, décrite d'après des spécimens récoltés par le "*Challenger*" aux îles Fidji, n'avait jamais encore été retrouvée.

Si *Metapenaeopsis difficilis* était déjà connue d'Indonésie, de Nouvelle-Calédonie et des îles Marquises ce qui rend sa présence aux îles Wallis et Futuna attendue, *Benthonectes filipes*, dans le Pacifique, n'était encore connu que des Hawaii, *Heponadus tener*, trouvé à plusieurs reprises dans l'océan Indien, n'était pas encore signalé, semble-t-il, dans le Pacifique, *Mesopenaeus mariae*, en dehors de l'océan Indien, n'était connu que de Taiwan et du Japon, *Cryptopenaeus clevai*, décrit d'Indonésie, n'avait depuis été signalé qu'au Japon (sous le nom de *Cryptopenaeus brevirostris*, voir HAYASHI, 1986). De même *Hymenopenaeus halli* et *H. neptunus* n'avaient pas été mentionnés, vers l'est, au delà de l'Indonésie. Nous pourrions ainsi passer en revue presque toutes les espèces

Source : MNHN, Paris

citées, pratiquement toutes voient leur aire de répartition considérablement augmentée à la suite des récoltes faites lors de MUSORSTOM 7.

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Source : MNHN, Paris

FIGURES EN COULEUR

FIG. 1. — *Benthonectes filipes* Smith, 1885 : 130 milles dans le sud du banc Bayonnaise, MUSORSTOM 7, st. DW 637, 13°37,2'S - 179°56,0'W, 820-830 m : 1 ♂ 13,3 mm.

FIG. 2. — *Cryptopenaeus clevai* Crosnier, 1984 : banc Bayonnaise, MUSORSTOM 7, st. CP 629, 11°53,7'S - 179°32,03'W, 400-420 m : 1 ♀ 49,5 mm.

FIG. 3. — *Hadropenaeus lucasi* (Bate, 1881) : île Futuna, MUSORSTOM 7, st. DW 505, 14°19,5'S - 178°04,3'W, 245-400 m : 1 ♀ 13,1 mm.

FIG. 4. — *Hadropenaeus lucasi* (Bate, 1881) : île Futuna, MUSORSTOM 7, st. DW 505, 14°19,5'S - 178°04,3'W, 245-400 m : 1 ♂ 10,5 mm.

FIG. 5. — *Hemipenaeus carpenteri* Wood Mason, 1891 : banc Tuscarora, MUSORSTOM 7, st. CP 565, 11°47,4'S - 178°25,3'W, 900 m : 1 ♀ 15,9 mm.

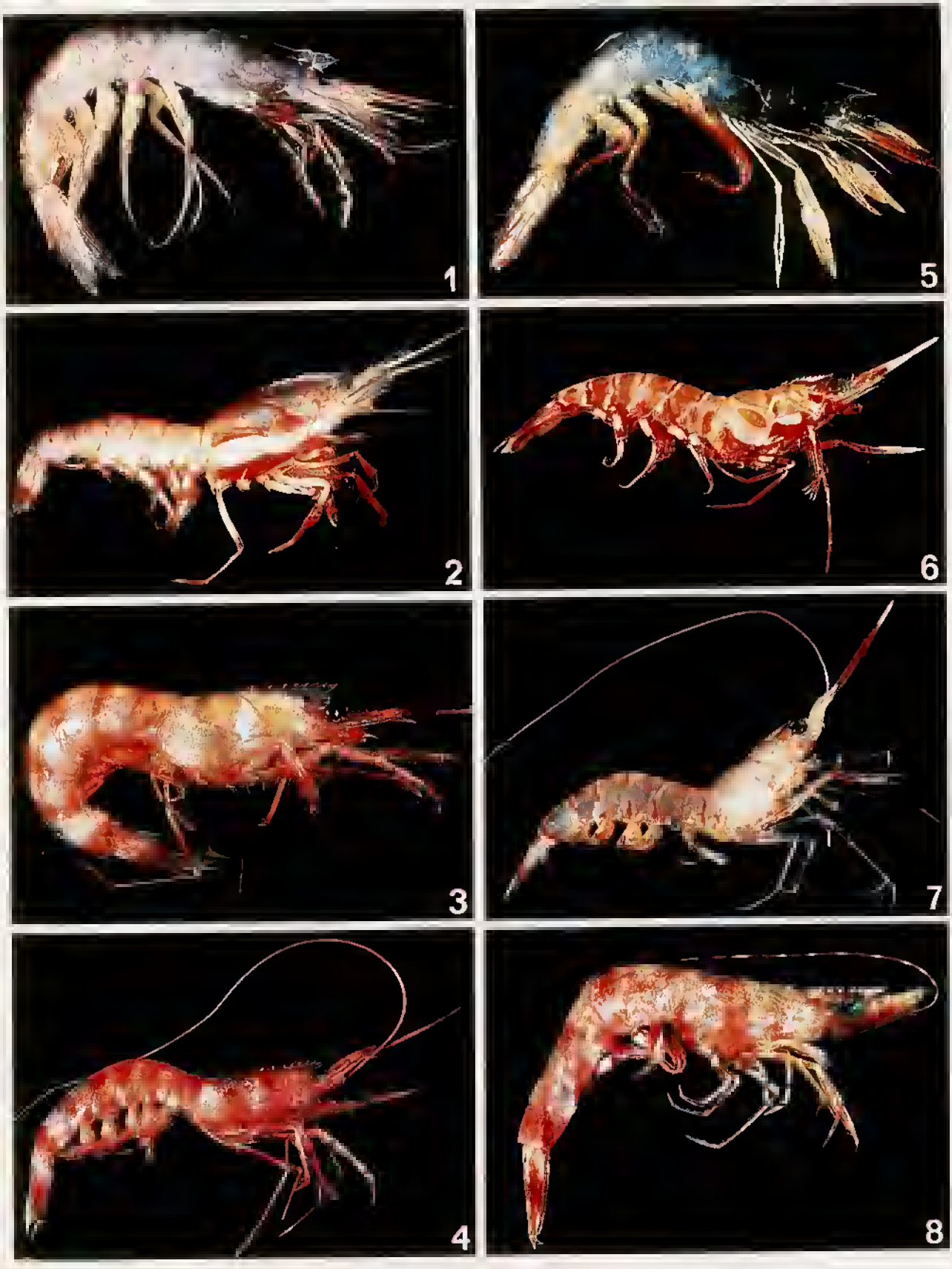
FIG. 6. — *Solenocera rathbuni* Ramadan, 1938 : île Futuna, MUSORSTOM 7, st. DW 508, 14°19,5'S - 178°04,5'W, 245-440 m : 1 ♂ 16,1 mm.

FIG. 7. — *Solenocera pectinata* (Bate, 1888) : île Wallis, MUSORSTOM 7, st. lagon sud, 13°17,9'S - 176°08,4'W, 45 m : 1 ♂ 10,8 mm.

FIG. 8. — *Metapenaeopsis difficilis* Crosnier, 1991 : île Futuna, MUSORSTOM 7, st. CP 498, 14°18,9'S - 178°03,1'W, 105-160 m : 1 ♂ 8,0 mm.

Photos J.-L. MENOU, ORSTOM

Source : MNHN, Paris



Source : MNHN, Paris

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Crustacea Decapoda : Deep-water hermit crabs (Parapaguridae) from French Polynesia with descriptions of four new species

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ABSTRACT

Parapagurid hermit crabs are reported for the first time from French Polynesia, based on a collection obtained during a deep-water trapping survey by the French government's Service Mixte de Contrôle Biologique des Armées. The collection contains nine species of the genus *Sympagurus* Smith, 1883, four of which are new, and one of *Strobopagurus* Lemaitre, 1989. The material of the previously described species of *Sympagurus* found in French Polynesia is compared with types and supplemental specimens from other IndoPacific regions, and the species diagnosed in light of a recent re-evaluation of diagnostic characters in this genus. Based on examination of representative material of all *Sympagurus* species from the world oceans, three informal groups are proposed for the species. Group 1, including nine species, is defined by the presence of a slender, curved epistomial spine; Group 2, including ten species, is defined by the presence of a vestigial pleurobranch on each side of the last thoracic somite; and a heterogenous Group 3, for the remaining 14 species and three subspecies, all of which lack a curved epistomial spine and vestigial pleurobranch on the last thoracic somite. A list of all known species of *Sympagurus* is presented, along with their geographic and bathymetric distributions.

RÉSUMÉ

Crustacea Decapoda : Pagures d'eau profonde (Parapaguridae) de la Polynésie française. Description de quatre espèces nouvelles.

Des pagures appartenant à la famille des Parapagnridae sont signalés pour la première fois en Polynésie française. Ils ont été récoltés lors de pêches aux casier en eau profonde, effectuées par le Service Mixte de Contrôle Biologique des Armées. Les récoltes renferment neuf espèces du genre *Sympagurus* Smith, 1883, dont quatre sont nouvelles, et une espèce du genre *Strobopagurus* Lemaitre, 1989. Les spécimens appartenant à des espèces déjà décrites du genre *Sympagurus* ont été comparés aux types et à des spécimens identifiés à ces espèces et provenant d'autres régions indopacifiques.

LEMAITRE, R., 1994. — Crustacea Decapoda : Deep-water hermit crabs (Parapaguridae) from French Polynesia with descriptions of four new species. *In* : A. CROSNIER (ed.), Résultats des Campagnes MUSORSTOM, Volume 12. *Mém. Mus. natn. Hist. nat.*, **161** : 375-419. Paris ISBN 2-85653-212-8.

Source : MNHN, Paris

Les identifications ont été faites en tenant compte de la récente réévaluation des caractères spécifiques dans ce genre, établie récemment (LEMAITRE, 1989). En se basant sur l'examen de spécimens de toutes les espèces de *Sympagurus*, trois groupes d'espèces sont proposés. Le groupe 1, comprenant neuf espèces, se caractérise par la présence d'une épine épistomienne fine et recourbée; le groupe 2, comprenant 10 espèces, présente une pleurobranchie rudimentaire, de chaque côté du dernier somite thoracique; le groupe 3, hétérogène, renferme les 14 espèces restantes et trois sous-espèces qui, toutes, sont sans épine épistomienne courbe ni pleurobranchie rudimentaire sur le dernier somite thoracique. Une liste de toutes les espèces connues de *Sympagurus* est présentée, accompagnée de leurs distributions géographique et bathymétrique.

INTRODUCTION

The deep-water hermit crab fauna of the vast IndoPacific region is incompletely known. Parapagurid hermit crabs, for example, a group represented throughout the world oceans and ranging from 55 to 5000 m in depth, have yet to be sampled from large areas of the Pacific (LEMAITRE, 1989, 1990a). This study is the first report of parapagurids from French Polynesia, and is based on collections obtained during deep-water trapping surveys in depths of 100 to 1120 m by the French government's Service Mixte de Contrôle Biologique des Armées (SMCB), under the direction of Mr Joseph POUPIN. The majority of the specimens were captured from 1986 to 1989 using baited cylindrical traps set in long-lines of 15 traps each. A detailed description of the survey and fishing techniques can be found in POUPIN *et al.* (1990). Of considerable value in this collection is the detailed, photographic information on coloration accompanying specimens of most species. The examination of this unique material revealed the existence of a total of 10 species, nine of which belong in the genus *Sympagurus* Smith, 1883, and one of *Strobopagurus* Lemaitre, 1989. Of the species of *Sympagurus*, four are new to science, and five although previously described have been found to be poorly defined. The materials of these five species is compared with types and supplemental material from other Pacific regions, and the species diagnosed in light of a recent re-evaluation of the diagnostic characters in species of this genus (LEMAITRE, 1989). One specimen in this collection is tentatively assigned to the broadly distributed species *Strobopagurus gracilipes* (A. Milne Edwards, 1891).

With the addition of the four new species discovered, the genus *Sympagurus* now contains 32 species and three subspecies, of which 26 species and three subspecies are distributed in the Pacific and Indian Ocean regions. One of these species, *Sympagurus boletifer* de Saint Laurent, 1972, was erroneously reported by LEMAITRE (1989) as having a curved epistomial spine. A re-examination of specimens has shown that the epistomial spine in this species is straight. Another of the species placed by LEMAITRE in *Sympagurus*, *S. sinensis* (de Saint Laurent, 1972), was recently removed from this genus and placed in a new monotypic genus described as *Bivalvopagurus* (see LEMAITRE, 1993). Based on information from the literature, LEMAITRE (1989) retained *Parapagurus andersoni* Henderson, 1896, in *Parapagurus* Smith, 1879, sensu stricto. However, examination of material of this species deposited in The Natural History Museum, London, has shown that it actually belongs in *Sympagurus*.

The general hermit crab terminology employed follows MCLAUGHLIN (1974), and for the Parapaguridae, LEMAITRE (1989). The specimens examined are listed by geographic area, arranged from north to south. Longitudes and latitudes are cited in degrees and decimals, or degrees and fractions of minutes, following the format of the original station data. In cases where the original depth of stations is in fathoms (fms), the equivalent in meters (m) is given in parenthesis. The Pacific island names are according to MOTTELER (1986). In the material examined sections, the length of the shield (to the nearest 0.1 mm) is indicated in parenthesis, and measured from the tip of the rostrum to the midpoint of the posterior margin of the shield. The types and supplemental material used for this study were collected during various expeditions, including the British *"Challenger"*; the United States Fish Commission Steamer *"Albatross"*; the Dutch *"Siboga"*; the Danish *"Galathea"*; cruises of the *"Suroît"* in the N.E. of the Mozambique Channel (BENTHEDI); and cruises by the Muséum national d'Histoire naturelle and Institut Français de Recherche scientifique pour le Développement en Coopération (ORSTOM), to study the bathyal fauna from the South Indo-West Pacific. The materials remain deposited in the following museums : The Natural History Museum [formerly British Museum (Natural History)], London (BMNH); Muséum national d'Histoire naturelle, Paris (MNHN); National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); Zoölogisch Museum, Amsterdam (ZMA); Zoologisk Museum, Copenhagen (ZMK). All the

Source : MNHN, Paris

material from French Polynesia was collected by Mr Joseph POUPIN (SMCB). In order to observe the armature of the chelipeds in some species, the dense setae were removed by immersing the appendage for 5-10 minutes in full-strength commercial "Clorox", and subsequently cleaning the surfaces with a fine brush.

SYSTEMATIC ACCOUNT

Family PARAPAGURIDAE Smith, 1882

Genus *STROBOPAGURUS* Lemaitre, 1989

Strobopagurus cf. ***gracilipes*** (A. Milne Edwards, 1891)

Figs 1-2

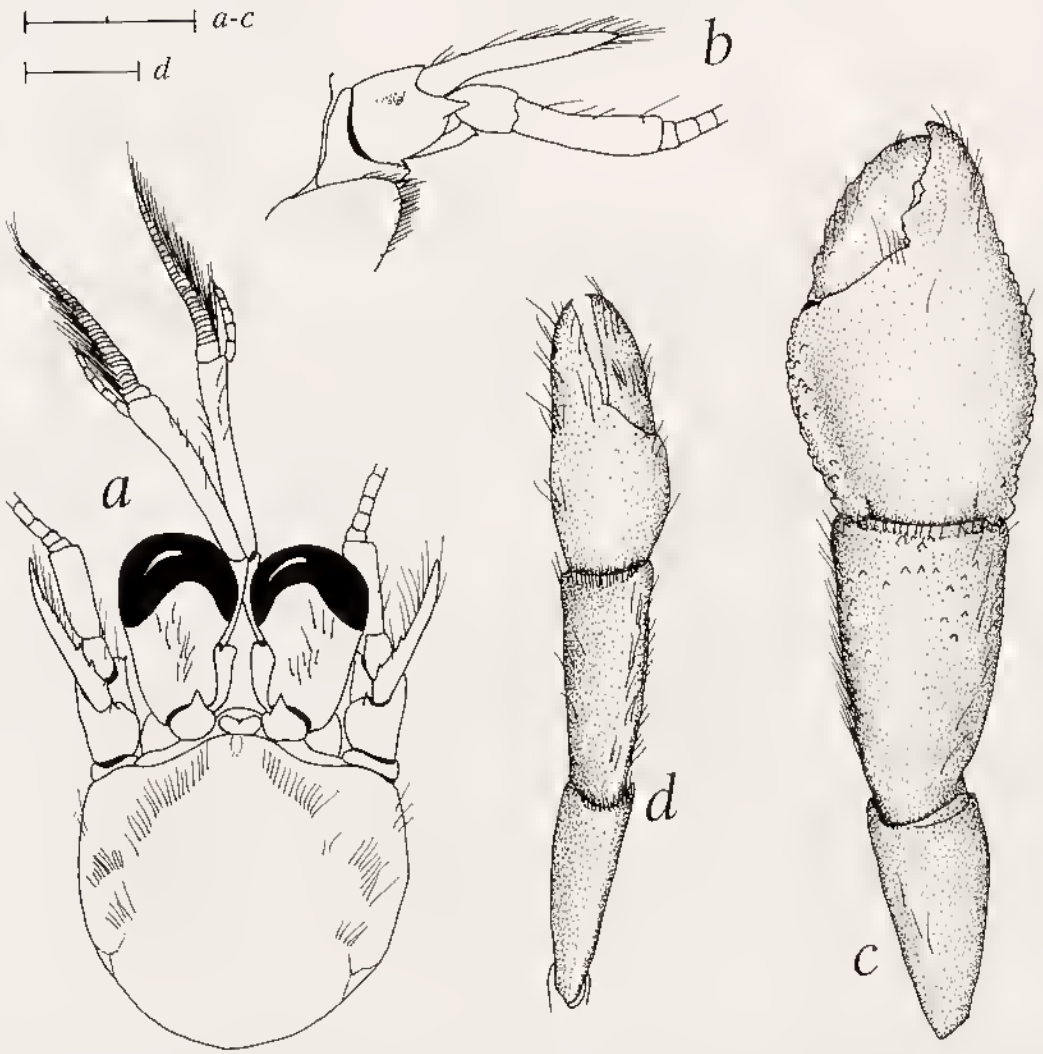

FIG. 1. — *Strobopagurus* cf. *gracilipes* (A. Milne Edwards, 1891), ♀ ovig. (3.7 mm), Society Islands, Stn D32 (MNHN-Pg 5135) : **a**, shield and cephalic appendages; **b**, right antennal peduncle, lateral view; **c**, right cheliped, dorsal view; **d**, left cheliped, dorsal view.

Scales equal 2 mm (a-c), and 1 mm (d).

Source : MNHN, Paris

Sympagurus gracilipes A. Milne Edwards, 1891 : 132.
Parapagurus gracilipes - FOREST, 1955 : 103, pl. 3, figs 8-11. — DE SAINT LAURENT, 1972 : 115.
Strobopagurus gracilipes - LEMAITRE, 1990b : 225, figs 3-5.
Strobopagurus cf. *sibogae* - POUPIN, 1993 : 51.

MATERIAL EXAMINED. — **French Polynesia. Society Islands**. Bora Bora, Stn D32, 16°28.37'S, 151°47.52'W, dredged, 562 m, 23.VI.1990 : 1 ♀ ovig. (3.7 mm) (MNHN-Pg 5135).

DIAGNOSIS. — See LEMAITRE (1990b : 225, figs 3-5).

COLOR. — Unknown.

REMARKS. — The female collected near Bora Bora is tentatively assigned to *Strobopagurus gracilipes* (A. Milne Edwards, 1891), a species previously reported in the Pacific only from Hawaii, and in the eastern

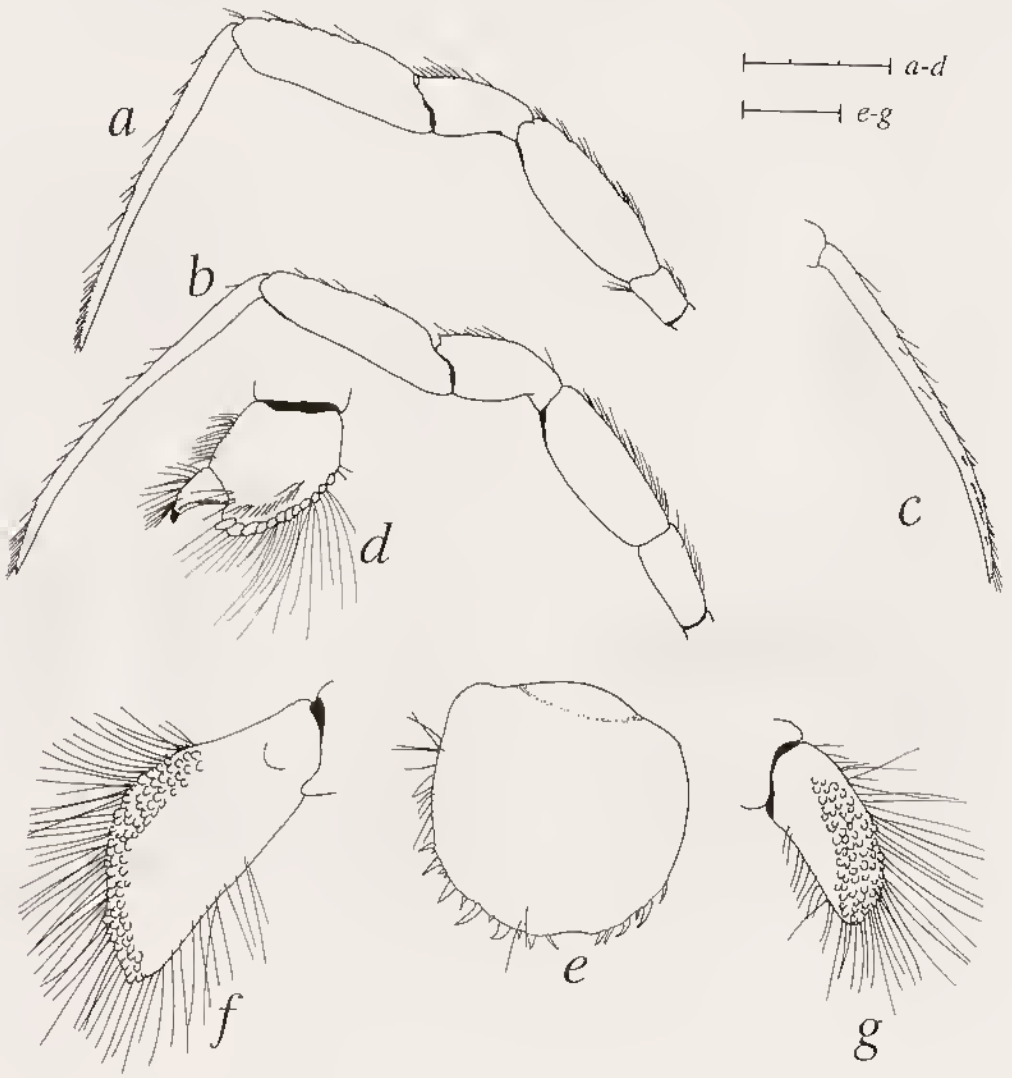

FIG. 2. — *Strobopagurus* cf. *gracilipes* (A. Milne Edwards, 1891), ♀ ovig. (3.7 mm), Society Islands, Stn D32 (MNHN-Pg 5135) : **a**, second left pereopod, lateral view; **b**, third left pereopod, lateral view; **c**, dactyl of same, mesial view; **d**, propodus and dactyl of left fourth pereopod, lateral view; **e**, telson, dorsal view; **f**, exopod of left uropod, dorsal view; **g**, exopod of right uropod, dorsal view.
Scales equal 3 mm (a-d), and 1 mm (e-g).

Source : MNHN, Paris

Atlantic from Portugal to Morocco, including the Azores, Canary and Cape Verde Islands (DE SAINT LAURENT, 1972; LEMAITRE, 1990b). The specimen agrees with A. MILNE EDWARDS'(1891) description and LEMAITRE's (1990b) supplemental diagnosis of *S. gracilipes*, except for the following : 1) the length of the antennal acicles does not exceed the corneae in the female from Bora Bora, whereas the acicles distinctly exceed the corneae in *S. gracilipes;* 2) the carpus of the left cheliped is unarmed in the female from Bora Bora, whereas the carpus is armed with dorsal and dorsodistal spines in *S. gracilipes;* and, 3) the relative lengths of the propodi of the walking legs are three times or less as long as broad in the female from Bora Bora, whereas the propodi are distinctly more than three times as long as broad in *S. gracilipes*. These differences possibly represent only intraspecific variations. However, the lack of sufficient material from the Pacific in general makes it difficult to ascertain this.

Genus *SYMPAGURUS* Smith, 1883

Sympagurus affinis (Henderson, 1888)

Figs 3-4, 28a

Parapagurus affinis Henderson, 1888 : 90, pl. 9, fig. 4. — ALCOCK, 1905 : 172. — GORDAN, 1956 : 337. — DE SAINT LAURENT, 1972 : 105.
Sympagurus affinis - LEMAITRE, 1989 : 37. — POUPIN, 1993 : 51.

TYPE MATERIAL. — Holotype : **North of New Guinea**, "*Challenger*", Stn 214, off Meangis Islands, 04°33'N, 127°6'E, 500 fms (915 m), 10.II.1875 : ♀ ovig. (9.0 mm) (BMNH 1888:33).

ADDITIONAL MATERIAL EXAMINED. — **French Polynesia. Austral Islands.** Rurutu, Stn 339, 22°28.4'S, 151°23.0'W, trapped, 710 m, 27.XI.1990 : 1 ♀ ovig. (5.7 mm) (MNHN-Pg 5136).

Hawaiian Islands. "*Albatross*" : Stn 3865, Pailolo Channel, between Maui and Molokai Islands, 256-283 fms (468-518 m), 10.IV.1902 : 1 ♀ (6.4 mm) (USNM 168908). — Stn 4115, Oahu Island, off Kahuku Point, 21°41'50"N, 158°08'50"W, 195-241 fms (357-441 m), 25.VII.1902 : 2 ♀ (4.8, 5.0 mm) (USNM 168909). — Stn 4132, Kauai Island, off Hanamaulu warehouse, 22°01'30"N, 159°21'10"W, 257-312 fms (470-571 m), 1.VIII.1902 : 1 ♀ (4.9 mm), 1 ♀ ovig. (4.9 mm) (USNM 168910).

Indonesia. "*Albatross*" : Stn 5586, Borneo, Sibuko Bay off Sipadan Island, 04°06'50"N, 118°47'20"E, 347 fms (635 m), 28.IX.1909 : 1 ♂ (5.0 mm) (USNM 168911). — Stn 5589, off Mabul Island, 04°12'10"N, 118°38'08"E, 260 fms (475 m), 29.IX.1909 : 1 ♂ (4.4 mm) (USNM 168912).

DIAGNOSIS. — Shield (Fig. 3a) as long as broad; dorsal surface weakly calcified medially. Rostrum broadly rounded, with low dorsal ridge. Anterior margins straight. Lateral projections broadly subtriangular, terminating bluntly. Ventrolateral margin usually unarmed. Posterior margin broadly rounded. Ocular peduncles more than half length of shield; ocular acicles subtriangular, terminating in multifid spine (Fig. 3b); corneae slightly dilated. Sternite of third maxillipeds with small spine on each side of midline. Epistomial spine absent. Antennular peduncle exceeding distal margin of corneae by full length of ultimate segment. Antennal peduncle (Fig. 3a, c-d) at most slightly exceeding distal margin of cornea; flagellum with setae <1 to 2 flagellar articles in length; fourth segment usually with very small spine on dorsolateral, distal angle; third segment with strong ventromesial distal spine; second segment with dorsolateral distal angle produced, terminating in strong multifid spine. Antennal acicles at most slightly exceeding distal margin of corneae, mesial margin armed with 9 to 11 spines. Chelipeds markedly dissimilar. Right cheliped (Fig. 3e) with densely setose chela; chela less than twice as long as wide, fingers weakly curved ventromesially, dactyl with weakly concave ventromesial face; dorsal and ventral faces of palm smooth or with scattered small tubercles, mesial and lateral faces of palm evenly rounded, with numerous small spines; carpus with numerous small tubercles or spines on dorsal surface. Left cheliped (Fig. 3f) with chela unarmed, usually well calcified; carpus with dorsodistal spine. Ambulatory legs (Fig. 4a-b) reaching to tip of extended right cheliped; dactyl about twice as long as propodus, with ventromesial row of about 10 corneous spines, and dorsal and dorsomesial rows of long, bristle-like setae; carpus with small dorsodistal spine; ischium and merus of second pereopod unarmed or with row of few small tubercles. Anterior lobe of sternite of third

Source : MNHN, Paris

pereopods unarmed. Fourth pereopod (Fig. 4c) with dactyl terminating in short, corneous claw; propodal rasp consisting of 1 row of ovate scales. Twelve pairs of gills; first 11 pairs trichobranchiale, twelfth pair consisting of vestigial pleurobranchs on last thoracic somite. Uropods (Fig. 4e-f) markedly asymmetrical. Telson (Fig. 4d) asymmetrical, with obsolete transverse suture separating anterior and posterior lobes; posterior lobes separated by U-shaped median cleft, terminal margins armed with corneous spines. Male first (Fig. 4g) gonopod with concave distal lobe; second gonopod (Fig. 4h) with distal segment nearly flat. Female with right second pleopod vestigial.

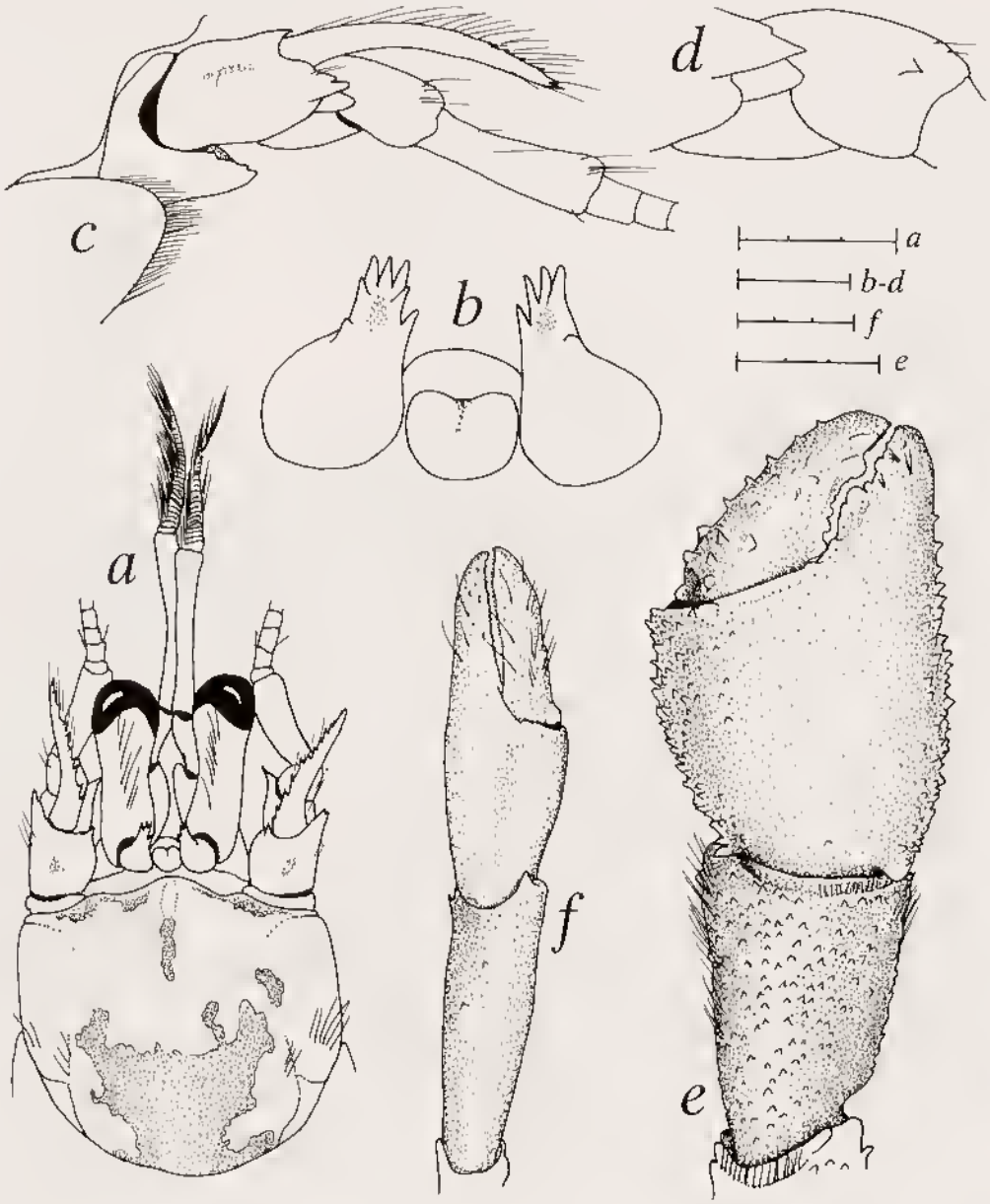

FIG. 3. — *Sympagurus affinis* (Henderson, 1888). **a-c** : ♀ ovig. (5.7 mm), Austral Islands, Rurutu, Stn 339 (MNHN-Pg 5136) : **a**, shield and cephalic appendages; **b**, ocular acicles, dorsal view; **c**, right antennal peduncle, lateral view. — **d**, ♀ (4.8 mm), Hawaiian Islands, "*Albatross*", Stn 4115 (USNM 168909) : supernumerary, third and fourth segments of right antennal peduncle, lateral view. — **e-f**, holotype ♀ ovig. (9.0 mm). Indonesia, "*Challenger*", Stn 214 (BMNH 1888:33) : **e**, right cheliped, dorsal view; **f**, left cheliped, dorsal view.
Scales equal 3 mm (a), 0.5 mm (b,d), 1 mm (c), and 3 mm (f,e).

Source : MNHN, Paris

COLOR (Fig. 28a). — Entire body cream yellow.

HABITAT AND SYMBIOTIC ASSOCIATIONS. — Gastropod shells usually with one actinian polyp attached.

DISTRIBUTION. — Indonesia, Philippines, Hawaii (DE SAINT LAURENT, 1972); Australia (LEMAITRE, unpublished); French Polynesia. Depth: 360 to 914 m.

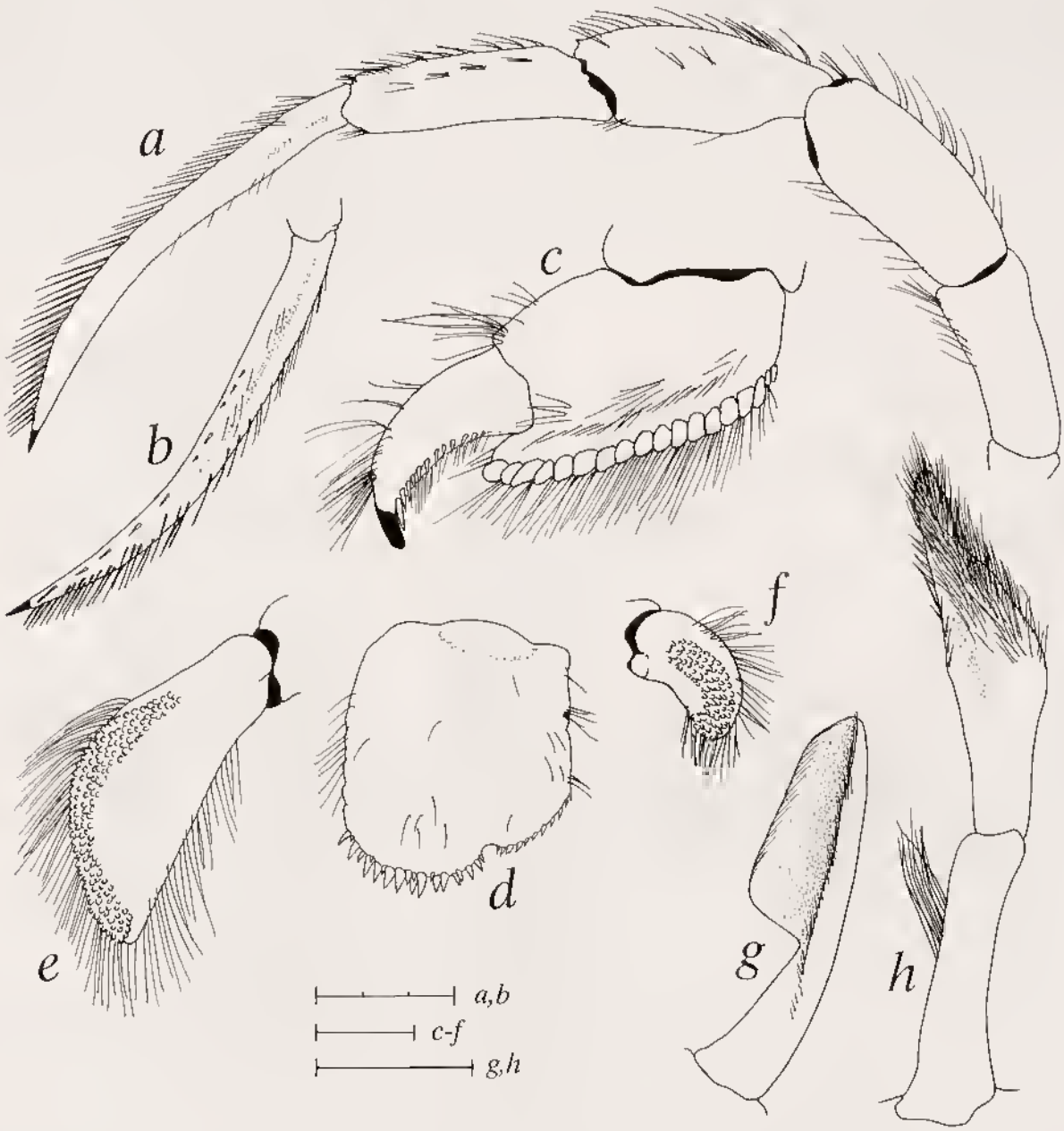

FIG. 4. — *Sympagurus affinis* (Henderson, 1888). **a-f** : ♀ ovig. (5.7 mm), Austral Islands, Stn 339 (MNHN-Pg 5136) : **a**, third left pereopod, lateral view; **b**, dactyl of same, mesial view; **c**, propodus and dactyl of fourth left pereopod, lateral view; **d**, telson, dorsal view; **e**, exopod of left uropod, dorsal view; **f**, exopod of right uropod, dorsal view. — **g-h**, ♂ (5.0 mm), Borneo, *"Albatross"*, Stn 5586 (USNM 168911) : **g**, male left first gonopod, mesial view; **h**, male left second gonopod, anterior view.

Scales equal 3 mm (a,b), 0.5 mm (c), 1 mm (d,f), and 1 mm (g,h).

Source : MNHN, Paris

Sympagurus boletifer (de Saint Laurent, 1972)

Figs 5-6, 27a-b, 28b-c

Parapagurus boletifer de Saint Laurent, 1972 : 110, figs 5, 20. — MIYAKE, 1978 : 72; 1982 : 120, pl. 40, fig. 4. — BABA *et al.*, 1986 : 196, fig. 144.
Sympagurus boletifer - LEMAITRE, 1989 : 37. — POUPIN, 1993 : 51.

TYPE MATERIAL. — Holotype : **Japan**, Tosa Bay, 250-300 m, 1963, coll. K. SAKAI : ♂ (8.0 mm) (MNHN-Pg 2230). Paratype : **Japan**, *"Albatross"*, Stn 3755, NW of Suno Saki, off Honshu Island, 52-77 fms (95-141 m), 19.V.1900 : 1 ♀ ovig. (6.9 mm) (USNM 168321).

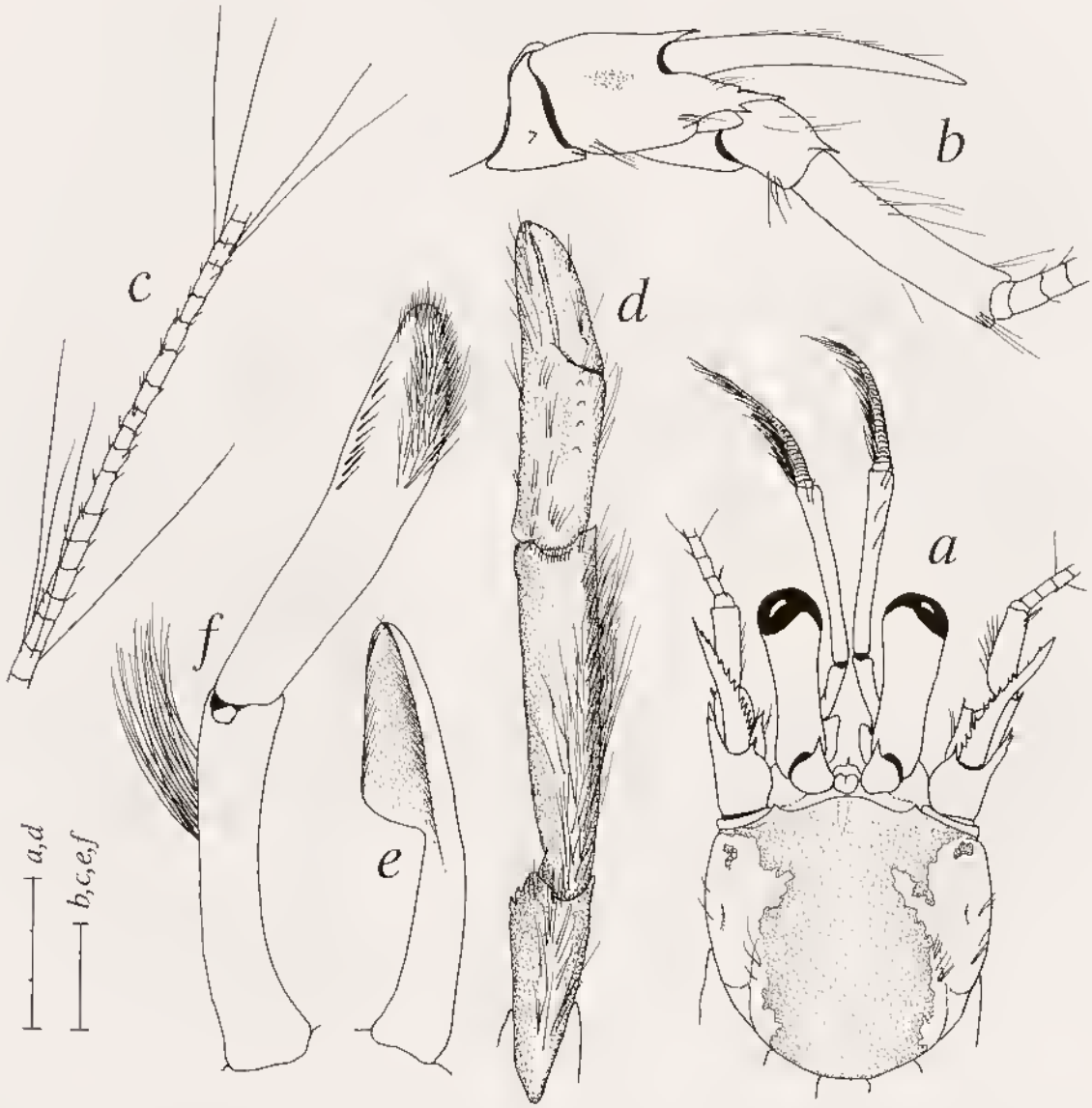

FIG. 5. — *Sympagurus boletifer* (de Saint Laurent, 1972). Austral Islands, Stn 344 : **a**, ♀ ovig. (5.5 mm) (MNHN-Pg 5137) : shield and cephalic appendages. — **b-f**, ♂ (5.7 mm) (MNHN-Pg 5137) : **b**, right antennal peduncle, lateral view; **c**, midportion of antennal flagellum; **d**, left cheliped, dorsal view; **e**, male first left gonopod, mesial view; **f**, male second left gonopod, anterior view.

Scales equal 3 mm (a,d), 1 mm (b), and 0.5 mm (c,e,f).

Source : MNHN, Paris

ADDITIONAL MATERIAL EXAMINED. — **French Polynesia. Austral Islands.** Raivavae, Stn 344, 23°53.3'S, 147°36.1'W, trapped, 350 m, 1.XII.1990 : 2 ♂ (5.3, 5.7 mm), 1 ♀ ovig. (5.5 mm) (MNHN-Pg 5137).

Western Indian Ocean. Comoro Islands. BENTHEDI : Stn 49F, Mayotte, Bovéni Passage, 300-450 m, 28.III.1977 : 1 ♂ (7.0 mm), 2 ♀ (6.1, 7.0 mm) (MNHN-Pg 5138).

DIAGNOSIS. — Shield (Fig. 5a) as long as broad; dorsal surface usually weakly calcified on half or more of surface; rostrum broadly rounded, little produced, with low dorsal ridge; anterior margins straight; lateral projections broadly subtriangular, terminating in spine. Posterior margin broadly rounded. Ocular peduncles more than half length of shield; ocular acicles subtriangular, terminating in strong spine; corneae slightly dilated. Sternite of third maxillipeds with small spine on each side of midline. Epistomial spine short, straight. Antennular peduncle exceeding distal margin of corneae by length of penultimate segment. Antennal peduncle (Fig. 5a-b) at most reaching distal margin of cornea; flagellum with setae arranged in series of long (4-8 articles in length) and short (~1 article in length) setae about every 15-20 articles (Fig. 5c); fourth segment with spine on dorsolateral distal angle; third segment with strong ventromesial distal spine; second segment with dorsolateral

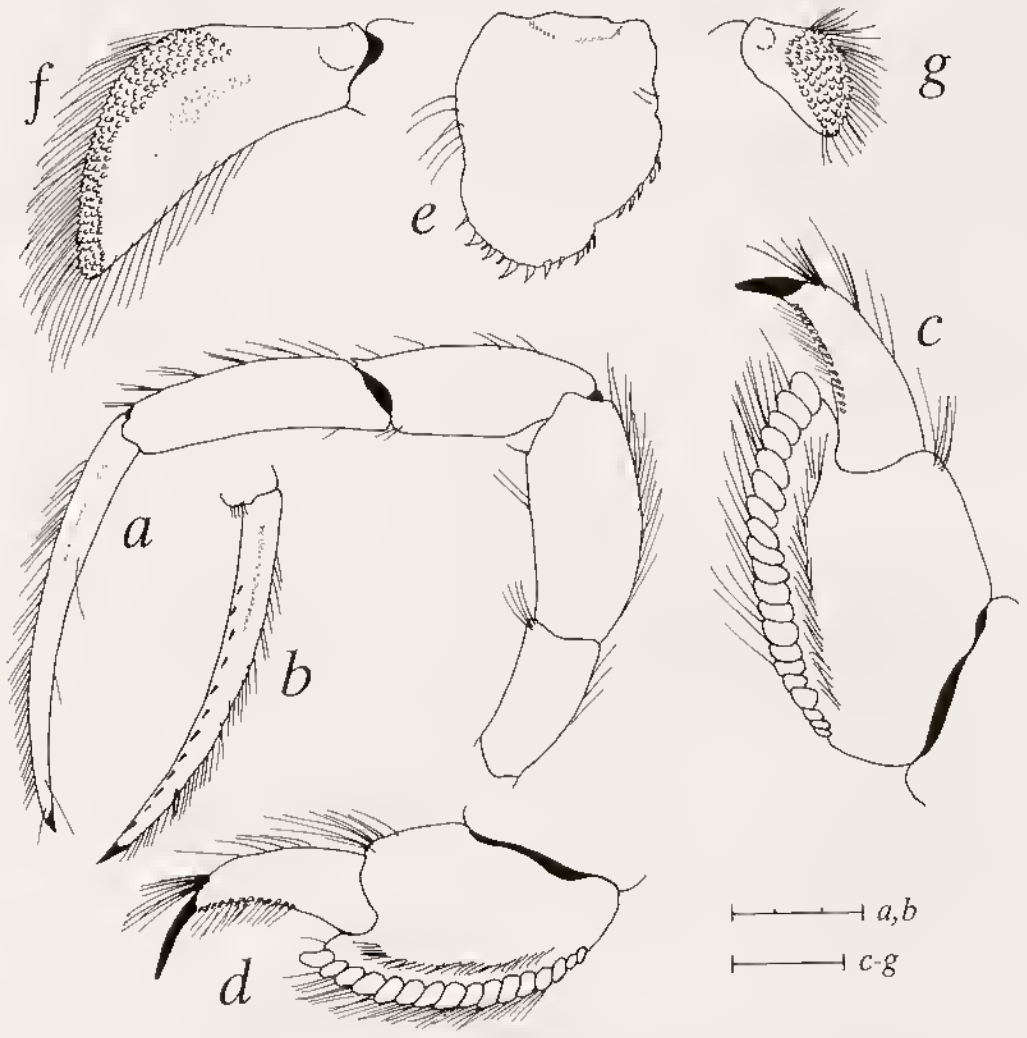

FIG. 6. — *Sympagurus boletifer* (de Saint Laurent, 1972). Austral Islands, Stn 344 : **a-c, e-g**, ♂ (5.7 mm) (MNHN-Pg 5137) : **a**, third left pereopod, lateral view; **b**, dactyl of same, mesial view; **c**, propodus and dactyl of left fourth pereopod (male), lateral view; **e**, telson, dorsal view; **f**, exopod of left uropod, dorsal view; **g**, exopod of right uropod, dorsal view. — **d**, ♀ ovig. (5.5 mm) (MNHN-Pg 5137) : propodus and dactyl of left fourth pereopod (female). Scales equal 3 mm (a,b), and 1 mm (c,g).

Source : MNHN, Paris

distal angle produced, terminating in multifid spine (occasionally with additional small spine dorsally). Antennal acicles reaching distal margin of corneae, mesial margin armed with 11 to 14 spines. Chelipeds strongly dissimilar. Right cheliped (Fig. 27a-b, 28b-c) massive; chela about as broad as long, with dorsal surface covered with numerous spines and densely covered with plumose setae (especially on distal half and fingers); fingers curved ventromesially; ventral face of palm and fingers covered with numerous mushroom-like tubercles; palm with lateral margin well delimited by row of spines; carpus with numerous small tubercles or spines on dorsal surface. Left cheliped (Fig. 5d) usually well calcified; palm with dorsomesial row of small tubercles; carpus with dorsodistal spine. Ambulatory legs (Fig. 6a-b) reaching to tip of extended right cheliped; dactyl about twice as long as propodus, with ventromesial row of about 12 corneous spines, and dorsal and dorsomesial rows of long, bristle-like setae; carpus with small dorsodistal spine. Anterior lobe of sternite of third pereopods armed with spine. Fourth pereopod (Fig. 6c-d) with dactyl terminating in corneous claw (more slender and longer in females than in males); propodal rasp consisting of 1 row of ovate scales. Eleven pairs of phyllobranch or intermediate gills (see LEMAITRE, 1989). Telson (Fig. 6e) and uropods strongly asymmetrical; telson with weak transverse suture separating anterior and posterior lobes; posterior lobes of telson separated by V-shaped median cleft, terminal margins armed with corneous spines (often strongly curved on left lobe). Male first (Fig. 5e) gonopod with concave distal lobe; second gonopod (Fig. 5f) with distal segment nearly flat. Female with right second pleopod vestigial.

COLOR (Fig. 28b-c). — Shield cream yellow tinged with orange. Ocular peduncles, antennular and antennal peduncles pale yellow; antennular flagella pale purple. Left cheliped and second to fifth pereopods uniformly pale purple. Chela and carpus of right cheliped with dorsal and ventral surface orange-reddish, with white mushroom-like tubercles or spines; merus whitish with tinge of pale orange distally.

HABITAT. — Probably gastropod shells.

DISTRIBUTION. — IndoPacific : Comoro Islands; Japan (DE SAINT LAURENT, 1972); Australia, Hawaii (LEMAITRE, unpublished); French Polynesia. Depth : 85 to 350 m.

Sympagurus dofleini (Balss, 1912)

Figs 7-8, 27c-f, 28d

Parapagurus Dofleini Balss, 1912 : 96, fig. 4b; 1913 : 50, pl. 1, fig. 5, pl 2, fig. 3.
Parapagurus ijimai Terao, 1913 : 383, fig. 4.
?*Sympagurus burkenroadi* Thompson, 1943 : 419, fig. 1 (see Remarks).
Parapagurus dofleini - GORDAN, 1956 : 338. — DE SAINT LAURENT, 1972 : 105. — MIYAKE, 1982 : 119, pl. 40, fig. 3. — POUPIN *et al.*, 1990 : 94 (in part), not pl. II-f (= *Sympagurus poupini* sp. nov.).
Sympagurus dofleini - LEMAITRE, 1989 : 37. — POUPIN, 1993 : 51.
?not *Parapagurus dofleini* - MIYAKE, 1978 : 75, figs 27a, 28 (see Remarks).

MATERIAL EXAMINED. — **French Polynesia. Austral Islands.** Rurutu, Stn 342, 22°26.2'S, 151°23.6'W, trapped, 600 m, 28.XI.1990 : 2 ♀ovigs. (16.3, 16.3 mm) (USNM 265392). — Raivavae, Stn 348, 23°49.5'S, 147°42.1'W, trapped, 500 m, 3.XII.1990 : 1 ♂ (16.0 mm) (MNHN-Pg 5140). — Rapa, Stn 434, 27°35.5'S, 144°15.8'W, trapped, 720 m, 18.VIII.1991 : 4 ♂ (11.3-12.9 mm), 1 ♀ (9.8 mm) (MNHN-Pg 5141).
Gambier Islands. Stn 311, 23°04.0'S, 135°01.6'W, trapped, 470 m, 11.X.1990 : 3 ♂ (17.1-21.8 mm), 1 ♀ (19.5 mm) (MNHN-Pg 5139).

DIAGNOSIS. — Shield (Fig. 7a) broader than long; dorsal surface usually with irregularly-shaped, weakly calcified areas. Rostrum broadly triangular, with low dorsal ridge. Anterior margins straight. Lateral projections broadly subtriangular, terminating acutely or bluntly. Posterior margin broadly rounded or often nearly semicircular. Ocular peduncles less than half length of shield; ocular acicles subtriangular, terminating in strong spine (occasionally bifid on one side); corneae slightly dilated. Sternite of third maxillipeds with small spine on each side of midline. Epistomial spine short, straight. Antennular peduncle exceeding distal margin of corneae by

Source : MNHN, Paris

about 0.3 length of penultimate segment. Antennal peduncle (Fig. 7a-b) exceeding distal margin of cornea by about 0.5 length of fifth segment; flagellum long, articles with scattered short setae less than half length of 1 article; fourth segment unarmed; third segment with strong ventromesial distal spine (often bifid or trifid). Antennal acicles usually slightly exceeding distal margin of corneae, mesial margin armed with 10 to 18 small spines. Chelipeds dissimilar, slender, with dense setae obscuring surfaces (Fig. 27e). Right cheliped (Fig. 27c-f) with chela at least twice as long as wide (~2.5 times as long as wide in males, ~2 times as long as wide in females); palm with well defined lateral margin, mesial face rounded and with small spines; dorsal surface unarmed, ventral surface covered with numerous small tubercles or spines; carpus with numerous small tubercles or spines on dorsal and ventral surfaces. Left cheliped (Fig. 7c) evenly calcified, chela unarmed; carpus with

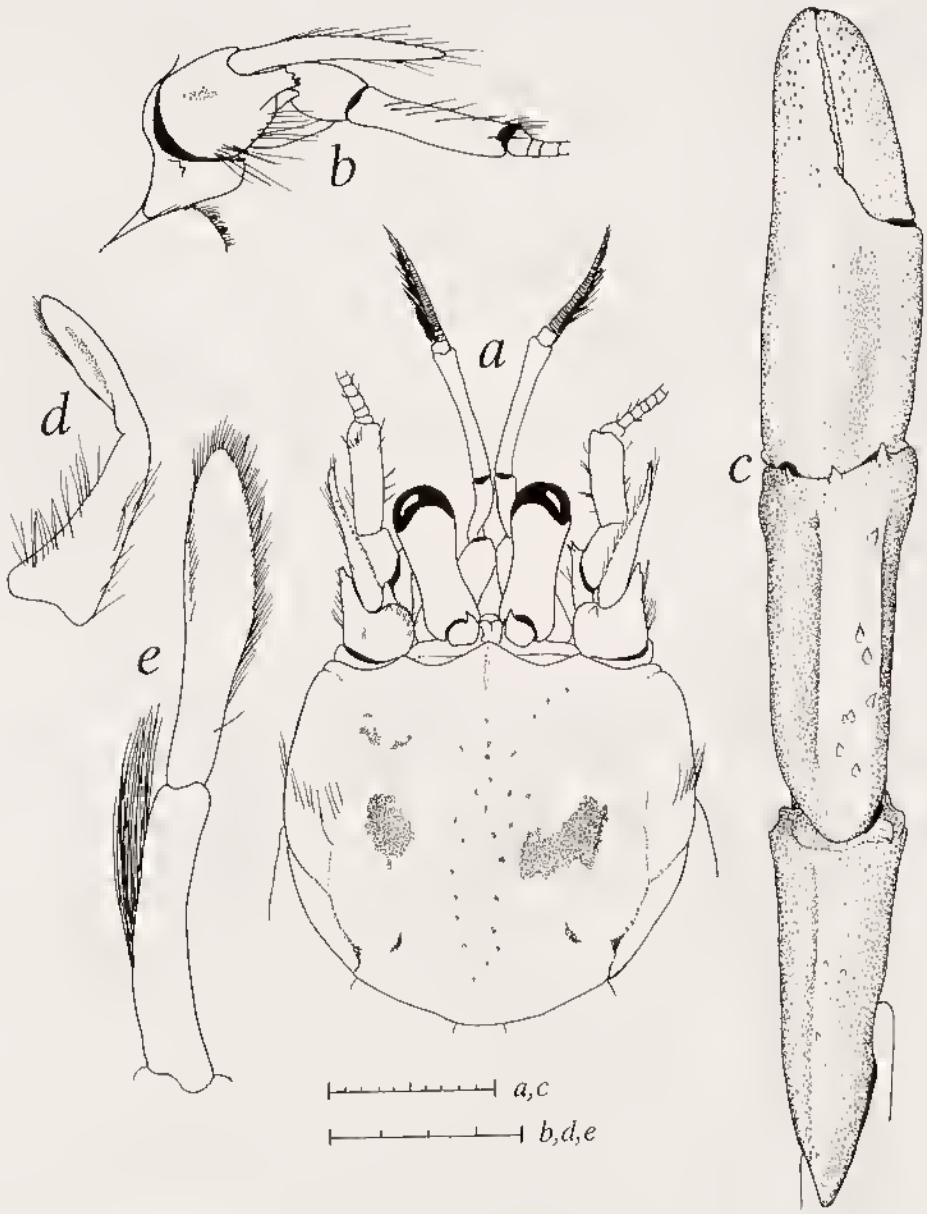

FIG. 7. — *Sympagurus dofleini* (Balss, 1912). ♂ (21.8 mm), Gambier Island, Stn 311 (MNHN-Pg 5139) : **a**, shield and cephalic appendages; **b**, right antennal peduncle, lateral view; **c**, denuded left cheliped, dorsal view; **d**, male first left gonopod, mesial view; **e**, male second left gonopod, anterior view.
Scales equal 10 mm (a,c), and 4 mm (b,d,e).

Source : MNHN, Paris

irregular row of small spines on broad, usually crest-like dorsal surface. Ambulatory legs (Fig. 8a-c) long, slender, reaching to tip of extended right cheliped; dactyl ~1.3 times as long as propodus (second pereopod), or ~1. 7 times as long as propodus (third pereopod); dactyls with irregular row of 20-45 small corneous spines on ventromesial margin; carpi each with small dorsodistal spine; merus and ischium of second pereopod with irregular rows of small spines on ventral margin. Anterior lobe of sternite of third pereopods unarmed, or with 1 or 2 spines. Fourth pereopod (Fig. 8d) with propodal rasp consisting of 3 to 4 irregular rows of conical scales. Twelve pairs of gills; first 11 pairs intermediate (see LEMAITRE, 1989 : 8), twelfth pair consisting of vestigial pleurobranchs on last thoracic somite. Uropods (Fig. 8f-g) distinctly asymmetrical. Telson (Fig. 8e) weakly asymmetrical, about as long as broad; anterior lobes each with fringe of long, often bristle-like setae on ventrolateral margin; posterior lobes separated by deep U-shaped cleft, terminal margins armed with numerous corneous spines. Male first gonopod (Fig. 7d) with ovate, weakly concave distal lobe; second gonopod (Fig. 7e) with distal segment nearly flat. Female second left pleopod with rami about twice as broad as rami of third to fourth pleopods; right second pleopod vestigial.

COLOR (Fig. 28d). — Entire body cream yellow.

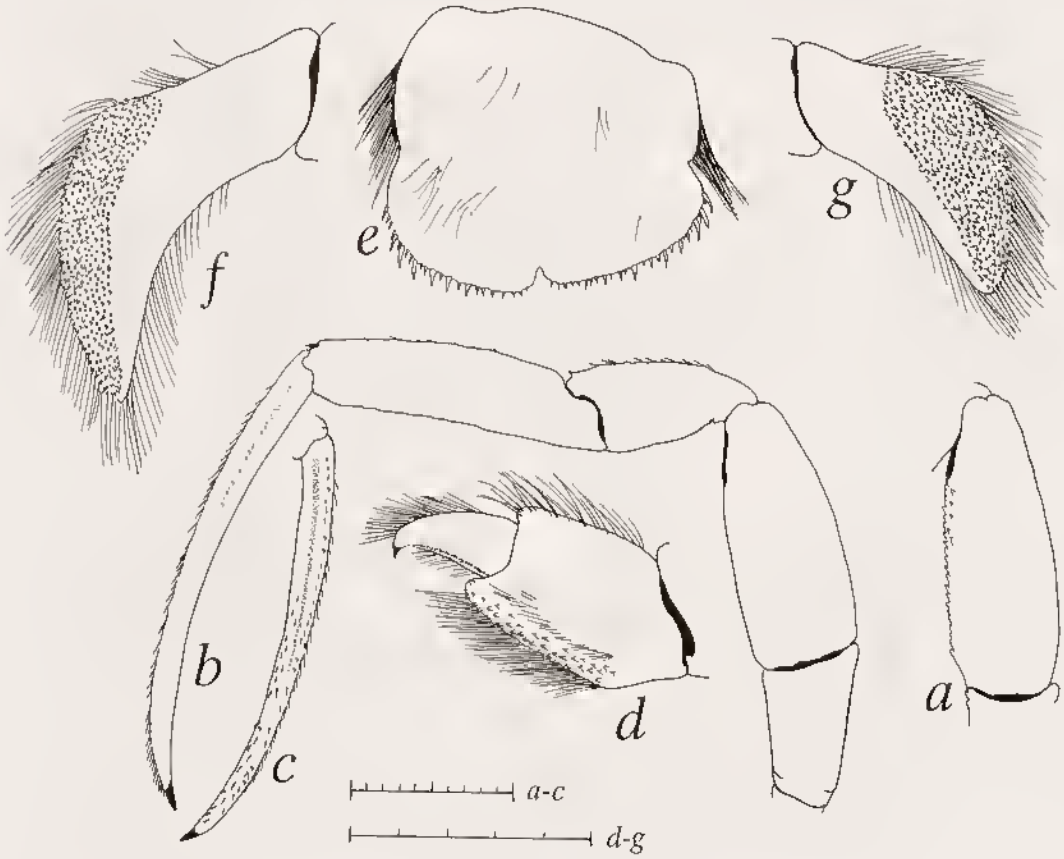

FIG. 8. — *Sympagurus dofleini* (Balss, 1912). Gambier Island, Stn 311 : **a-d**, ♂ (21.8 mm) (MNHN-Pg 5139) : **a**, merus of left second pereopod, lateral view; **b**, third left pereopod, lateral view; **c**, dactyl of same, mesial view; **d**, propodus and dactyl of left fourth pereopod, lateral view. — **e-g**, ♀ (19.5 mm) (MNHN-Pg 5139) : **e**, telson, dorsal view; **f**, exopod of left uropod, dorsal view; **g**, exopod of right uropod, dorsal view.
Scales equal 10 mm (a-c), and 5 mm (d-g).

HABITAT AND SYMBIOTIC ASSOCIATIONS. — This species is commonly found using actinians for housing (see FAUTIN-DUNN *et al.*, 1980). However, the specimens from French Polynesia were all found inhabiting an unidentified zoanthid.

Source : MNHN, Paris

DISTRIBUTION. — Western and central Pacific : Borneo, Japan (Sagami Bay), Guam, Hawaii (BALSS, 1913; TERAO, 1913; DE SAINT LAURENT, 1972; FAUTIN-DUNN *et al.*, 1980); Australia (LEMAITRE, unpublished), and French Polynesia. Indian Ocean? (see Remarks) : Zanzibar (THOMPSON, 1943). Depth : 350 to 900 m.

REMARKS. — (See also *Sympagurus poupini* sp. nov.). As pointed out by DE SAINT LAURENT (1972), the description and figures of *Parapagurus ijimai* Terao, 1913, clearly indicate that this taxon is a junior synonym of *Sympagurus dofleini* (Balss, 1912). *Sympagurus burkenroadi* Thompson, 1943, described from Zanzibar, in the western Indian Ocean, was also considered by DE SAINT LAURENT (1972) as a junior synonym of BALSS' *S. dofleini*. From THOMPSON's (1943) description and figures of *S. burkenroadi* this taxon can only questionably be synonymized with BALSS' *S. dofleini*. During a review of the materials of *Sympagurus* species, *S. dofleini* was not found to occur outside the western and central Pacific.

The report by MIYAKE (1978 : 74, figs 27a, 28) of *Parapagurus dofleini*, from Japan, does not appear to represent *Sympagurus dofleini* Balss. MIYAKE's diagnosis could apply to several similar species; however, his illustrations appear to represent *Strobopagurus sibogae* (de Saint Laurent, 1972). MIYAKE's illustrations show a markedly asymmetrical telson with strong spines, strongly dilated corneae, long antennal acicles well exceeding the eyes, and a right chela with convex lateral and mesial margins armed with spines. In contrast, in *S. dofleini*, the telson is weakly asymmetrical and armed with small short spines (Fig. 8e), the antennal acicles slightly exceed the eyes (Fig. 7a), and the right chela is elongated with nearly straight lateral and mesial margins armed at most with small tubercles (Fig. 27c-f). Furthermore, the type of housing reported by MIYAKE as "dwelling shells ... usually encrusted with one or two sea anemones", is not the typical large actinian or zoanthid inhabited by *S. dofleini*.

POUPIN *et al.* (1990) reported that 813 specimens of *Sympagurus dofleini* (as *Parapagurus dofleini*) were found during the SMCB trapping program in French Polynesia, and indicated that it was one of the most frequently captured invertebrates. However, examination of a representative portion of POUPIN's material revealed that in addition to *S. dofleini* Balss, it contains the new species *S. poupini*.

Sympagurus planimanus (de Saint Laurent, 1972)

Figs 9-10

Parapagurus planimanus de Saint Laurent, 1972 : 109, figs 4, 22.
Sympagurus planimanus - LEMAITRE, 1989 : 37. — POUPIN, 1993 : 51.

TYPE MATERIAL. — Holotype : **Indonesia**, "*Siboga*", Stn 45, 07°24'S, 118°15.2'E, 794 m, 6.IV.1899 : ♂ (6.3 mm) (ZMA De 103.111).

Paratypes : **Indonesia**. Same locality as holotype : 26 ♂ (3.1-6.1 mm), 20 ♀ (3.7-5.1 mm), 16 ♀ ovigs (3.6-5.1 mm) (ZMA De 103.110). — "*Albatross*", Stn 5586, Borneo, Sibuko Bay, off Sipadan Island, 04°06'50"N, 118°47'20"E, 347 fms (635 m), 28.IX.1909 : 2 ♂ (5.0-5.6 mm) (USNM 168949). — Stn 5590, Borneo, Sibuko Bay, off Mabul Island, 04°10'50"N, 118°39'35"E, 310 fms (567 m), 29.IX.1909 : 1 ♂ (5.1 mm), 1 ♀ (4.4 mm) (USNM 168950). — Stn 5618, Molucca Passage, off Maren Islands, 00°37'N, 127°15'E, 417 fms (763 m) : 3 ♂ (3.5-5.5 mm), 1 ♀ (3.6 mm) (USNM 168951).

ADDITIONAL MATERIAL EXAMINED. — **French Polynesia, Society Islands**, Bora Bora, Stn D32, 16°28.37'S, 151°47.52'W, dredged, 562 m, 23.VI.1990 : 1 ♀ (2.9 mm) (MNHN-Pg 5142).

DIAGNOSIS. — Shield (Fig. 9a) as long as broad; dorsal surface weakly calcified medially. Rostrum broadly rounded, little produced, with low dorsal ridge. Anterior margins straight. Lateral projections broadly subtriangular, terminating bluntly. Ventrolateral margin usually with small spine. Posterior margin broadly rounded. Ocular peduncles more than half length of shield; ocular acicles subtriangular, terminating in strong spine; corneae slightly dilated. Sternite of third maxillipeds with small spine on each side of midline. Epistomial spine absent. Antennular peduncle exceeding distal margin of corneae by length of penultimate segment. Antennal peduncle (Fig. 9a-b) at most exceeding distal margin of cornea by 0.25 length of fifth segment; flagellum with numerous setae 1-3 flagellar articles in length; fourth segment with spine on dorsolateral, distal angle; third segment with

Source : MNHN, Paris

strong ventromesial distal spine; second segment with dorsolateral distal angle produced, terminating in strong spine. Antennal acicles reaching distal margin of corneae, mesial margin armed with 7 to 10 spines. Chelipeds dissimilar, with moderately dense setation. Right cheliped (Fig. 9c-e) with chela less than twice as long as wide, fingers strongly curved ventromesially, dactyl with concave ventromesial face; dorsal and ventral faces of palm smooth; palm with distinct dorsomesial and lateral margins each formed by row of spines, and rounded mesial face with low tubercles; carpus with numerous small tubercles or spines on dorsal surface. Left cheliped (Fig. 9f) with chela unarmed, usually well calcified; carpus with dorsodistal spine. Ambulatory legs (Fig. 10a-b) reaching to tip of extended right cheliped; dactyl about twice as long as propodus, with ventromesial row of about 5 well

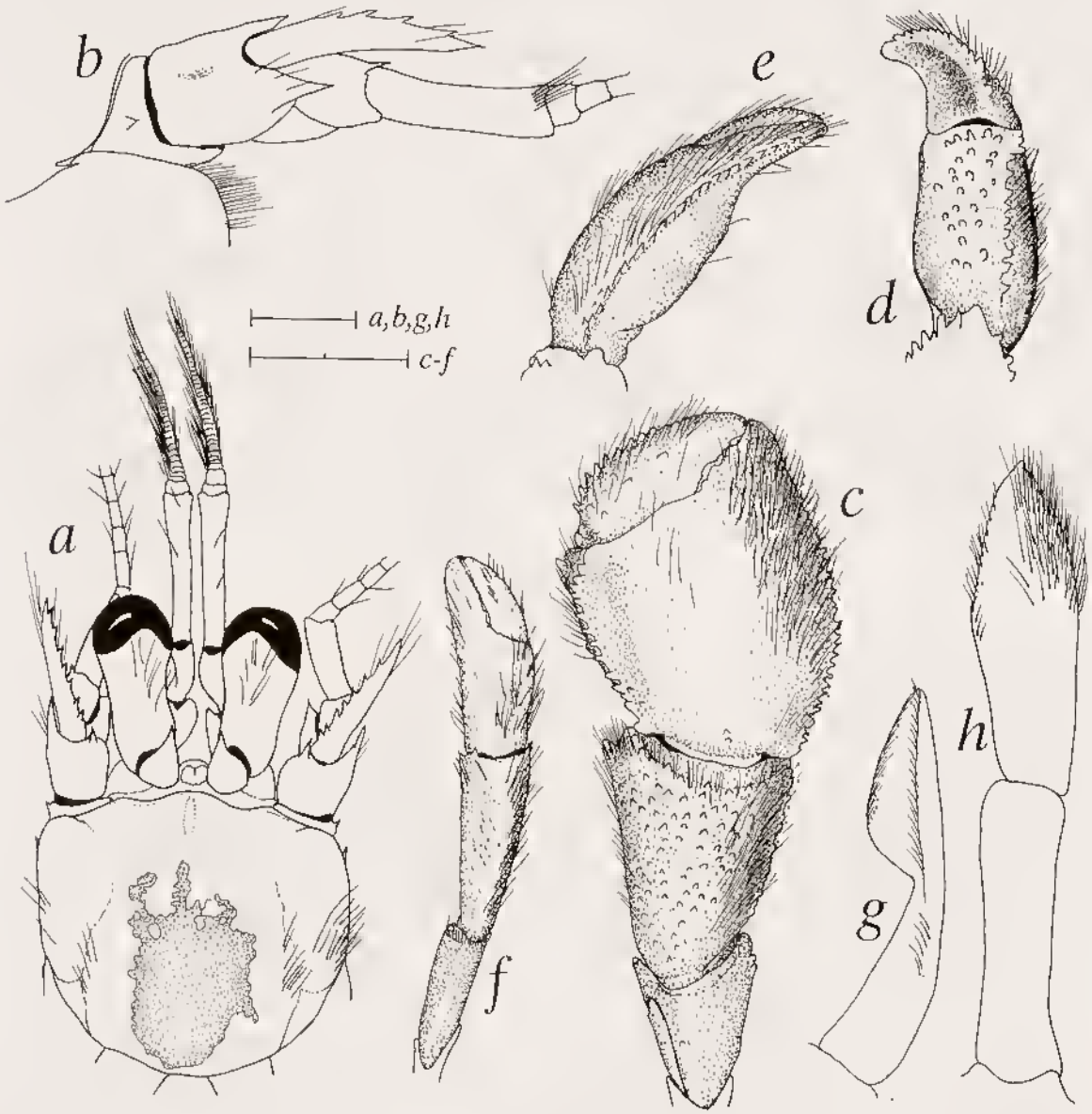

FIG. 9. — *Sympagurus planimanus* (de Saint Laurent, 1972). **a-f**, ♀ (2.9 mm), Society Islands, Stn D 32 (MNHN-Pg 5142) : **a**, shield and cephalic appendages; **b**, right antennal peduncle, lateral view; **c**, right cheliped, dorsal view; **d**, chela of same, mesial view; **e**, same, lateral view; **f**, left cheliped, dorsal view. — **g-h**, ♂ (5.1 mm), Borneo, "*Albatross*", Stn 5590 (USNM 168950) : **g**, male first left gonopod, mesial view; **h**, male second left gonopod, anterior view.

Scales equal 1 mm (a), 0.5 mm (b,g,h), and 2 mm (c-f).

Source : MNHN, Paris

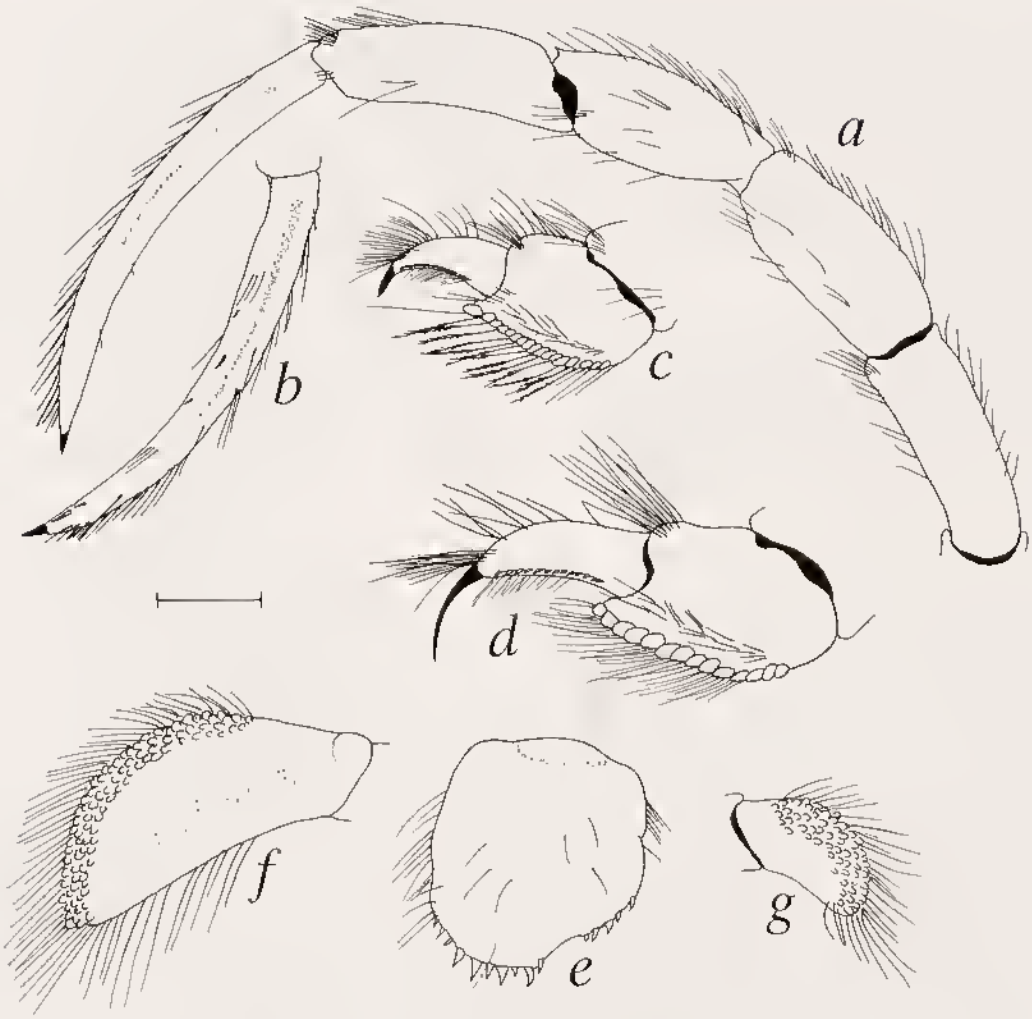

FIG. 10. — *Sympagurus planimanus* (de Saint Laurent, 1972). **a-c, e-g**, ♀ (2.9 mm), Society Islands, Stn D32 (MNHN-Pg 5132) : **a**, third left pereopod, lateral view; **b**, dactyl of same, mesial view; **c**, propodus and dactyl of left fourth pereopod (male), lateral view; **e**, telson, dorsal view; **f**, exopod of left uropod, dorsal view; **g**, exopod of right uropod, dorsal view. — **d**, paratype ♀ (4.2 mm), southeastern Indian Ocean (ZMA De 103.110) : propodus and dactyl of left fourth pereopod (female), lateral view.

Scale equals 1 mm (a,b), and 0.5 mm (c-g).

spaced corneous spinules, and dorsal and dorsomesial rows of long, bristle-like setae; carpus with small dorsodistal spine. Anterior lobe of sternite of third pereopods unarmed. Fourth pereopod (Fig. 10c-d) with long, curved corneous claw in large females (shield length > 4.0 mm); propodal rasp consisting of 1 row of ovate scales. Twelve pairs of gills; first 11 pairs trichobranchiate, twelfth pair consisting of vestigial pleurobranchs on last thoracic somite. Uropods (Fig. 10f-g) markedly asymmetrical. Telson (Fig. 10e) asymmetrical, with weak median cleft separating anterior and posterior lobes; posterior lobes separated by broad, shallow sinus, terminal margins armed with corneous spines. Male first (Fig. 9g) gonopod with concave distal lobe; second gonopod (Fig. 9h) with distal segment nearly flat. Female with right second pleopod vestigial.

COLOR. — Unknown.

HABITAT. — Gastropod shells.

DISTRIBUTION. — Indonesia, China Sea (DE SAINT LAURENT, 1972), and French Polynesia. Depth: 100 to 600 m.

Source : MNHN, Paris

Sympagurus trispinosus (Balss, 1911)

Figs 11-12, 28c

Parapagurus arcuatus var. *trispinosa* Balss, 1911 : 3; 1912 : 100, fig. 8, pl. 7, fig. 2, pl. 10, fig. 4. — Gordan, 1956 : 338.

Parapagurus trispinosus - De Saint Laurent, 1972 : 105.

Sympagurus trispinosus - Lemaitre, 1989 : 37. — Poupin, 1993 : 51.

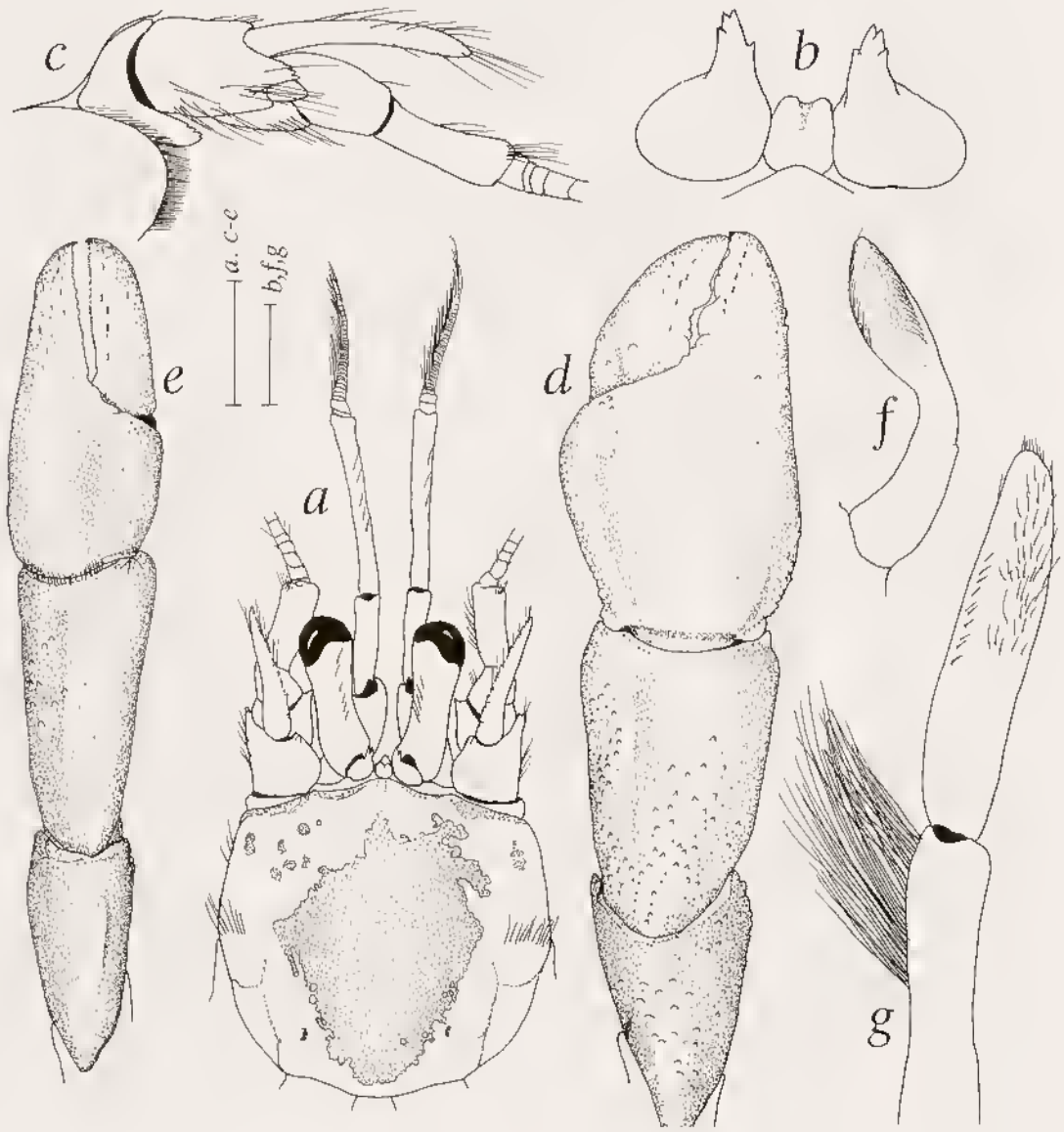

Fig. 11. — *Sympagurus trispinosus* (Balss, 1911). **a**, **c-e**, ♀ ovig. (11.9 mm), Tuamotu, Stn 309 (MNHN-Pg 5143) : **a**, shield and cephalic appendages; **c**, right antennal peduncle, lateral view; **d**, right cheliped, dorsal view; **e**, left cheliped, dorsal view. — **f-g**, ♂ (11.1 mm). Philippine Islands, "*Albatross*", Stn 5470 (USNM 168902) : **f**, male first left gonopod, mesial view; **g**, male second left gonopod, anterior view. — **b**, ♂ (12.5 mm), Philippine Islands, "*Albatross*", Stn 5467 (USNM 168900) : ocular acicles, dorsal view.

Scales equal 5 mm (a,d,c), 1 mm (b,f,g), and 2.5 mm (c).

Source : MNHN, Paris

MATERIAL EXAMINED. — **French Polynesia. Tuamotu.** 16°37'S, 143°32'W, trapped, 750 m, 12.XI.1988 : 1 ♀ (9.3 mm) (MNHN-Pg 4453). — Makemo, Stn 309, 16°34.2'S, 143°38.7'W, trapped, 580 m, 7.X.1990 : 1 ♀ ovig. (11.9 mm) (MNHN-Pg 5143).

Indonesia. *"Galathea"* 1950-52 : Stn 324, 06°38'N, 96°00'E, Strait of Malacca, 1140 m, 9.V.1951 : 1 ♀ (4.3 mm), (ZMK).

"Siboga" : Stn 161, 01°10.5'S, 130°09'E, 798 m, 17.VIII.1899 : 1 ♀ (11.0 mm) (ZMA De 103.113).

"Albatross" : Stn 5656, Gulf of Boni, off Olang Point, 03°17'40"S, 120°36'45"E, 484 fms (885 m), 19.XII.1909 : 1 ♀ (7.5 mm) (USNM 168905). — Stn 5648, Buton Strait, 05°33'S, 122°20'E, 559 fms (1022 m), 16.XII.1909 : 1 ♂ (10.0 mm), ♀ (6.1 mm) (USNM 168904).

Philippine Islands. *"Albatross"*, Stn 5115, SW of Sombrero Island, Balayan Bay and Verde Island Passage, 13°37'11"N, 120°43'40"E, 340 fms (622 m), 20.I.1908 : 1 ♀ ovig. (12.1 mm) (USNM 168897). — Stn 5348, Palawan Passage, off Point Tabonan, 10°57'45"N, 118°38'1"E, 375 fms (686 m), 27.XII.1908 : 1 ♂ (8.8 mm), 1 ♀ ovig. (13.9 mm) (USNM 168898). — Stn 5423, Cagayan Island, Jolo Sea, 09°38'30"N, 121°11'E, 508 fms (929 m), 31.III.1909 : 1 ♀ (10.0 mm) (USNM 168899). — Stn 5467, east coast of Luzon, 13°35'27"N, 123°37'18"E, 480 fms (878 m), 18.VI.1909 : 1 ♂ (12.5 mm), 1 ♀ ovig. (12.0 mm) (USNM 168900). — Stn 5469, east coast of Luzon, 13°36'48"N, 123°38'24"E, 500 fms (914 m), 18.VI.1909 : 1 ♂ (11.4 m) (USNM 168901). — Stn 5470, east coast of Luzon, 13°37'30"N, 123°41'09"E, 560 fms (1024 m), 18.VI.1909 : 1 ♂ (11.1 mm) (USNM 168902). — Stn 5488, between Leyte and Mindanao, 10°00'N, 125°06'45"E, 772 fms (1412 m), 31.VII.1909 : 1 ♂ (11.1 mm) (USNM 168903).

DIAGNOSIS. — Shield (Fig. 11a) as long as broad; dorsal surface weakly calcified medially. Rostrum broadly rounded, little produced, with low dorsal ridge. Anterior margins straight. Lateral projections broadly subtriangular, terminating acutely or bluntly. Posterior margin broadly rounded. Ocular peduncles half or slightly more than length of shield; ocular acicles (Fig. 11b) subtriangular, terminating in bifid or multifid spine; corneae slightly dilated. Sternite of third maxillipeds with small spine on each side of midline. Epistomial spine short, straight. Antennular peduncle exceeding distal margin of corneae by about 0.3 length of penultimate segment. Antennal peduncle (Fig. 11a, c) exceeding distal margin of cornea by about 0.5 length of fifth segment; flagellum long, naked; fourth segment unarmed; third segment with strong ventromesial distal spine (occasionally bifid). Antennal acicles slightly exceeding distal margin of corneae, with mesial margin armed with 9 to 13 small spines. Chelipeds dissimilar, with dense setae obscuring surfaces. Right cheliped (Fig. 11d) with chela less than twice as long as wide, dorsal and ventral faces smooth; palm with mesial and lateral faces rounded or with dorsolateral margin weakly delimited by irregular rows of small spines; carpus with numerous small tubercles or spines on proximal half of dorsal surface. Left cheliped (Fig. 11e) evenly calcified, chela unarmed; carpus unarmed or with irregular row of tubercles or spines on dorsal margin. Ambulatory legs (Fig. 12a-b) long, slender, reaching to tip of extended right cheliped; dactyl ~1.7 times as long as propodus, with row of about 18 corneous spines on ventromesial margin, and with several short, oblique rows of bristles on mesial face distally; carpus with small dorsodistal spine; ischium and merus of second pereopod with row of small often obsolete spines on ventral margin. Anterior lobe of sternite of third pereopods unarmed, or with 1 spine. Fourth pereopod (Fig. 12c) with propodal rasp consisting of 3 to 4 irregular rows of conical scales. Twelve pairs of gills; first 11 pairs intermediate in shape (see LEMAITRE, 1989 : 8), 1welfth pair consisting of vestigial pleurobranchs on last thoracic somite. Uropods (Fig. 12e-f) markedly asymmetrical. Telson (Fig. 12d) asymmetrical; anterior lobes each with fringe of long setae on ventrolateral margin; posterior lobes separated by broad, shallow median cleft, terminal margins armed with numerous corneous spines. Male first gonopod (Fig. 11f) with ovate, weakly concave distal lobe; second gonopod (Fig. 11g) with distal segment nearly flat. Female second left pleopod with rami about twice as broad as rami of third and fourth pleopods; right second pleopod vestigial.

COLOR (Fig. 28e). — Body cream yellow.

HABITAT AND SYMBIOTIC ASSOCIATIONS. — One of the specimens from French Polynesia was found inhabiting a gastropod shell with an unidentified actinian. This species associates with actinians that secrete a chitinous pseudoshell (see FAUTIN-DUNN *et al.*, 1980).

DISTRIBUTION. — IndoPacific : Zanzibar (BALSS, 1911); South Africa, Indonesia (DE SAINT LAURENT, 1972); Guam (FAUTIN-DUNN *et al.*, 1980); Philippines, Australia (LEMAITRE, unpublished); and French Polynesia. Depth : 580 to 1412 m.

Source : MNHN, Paris

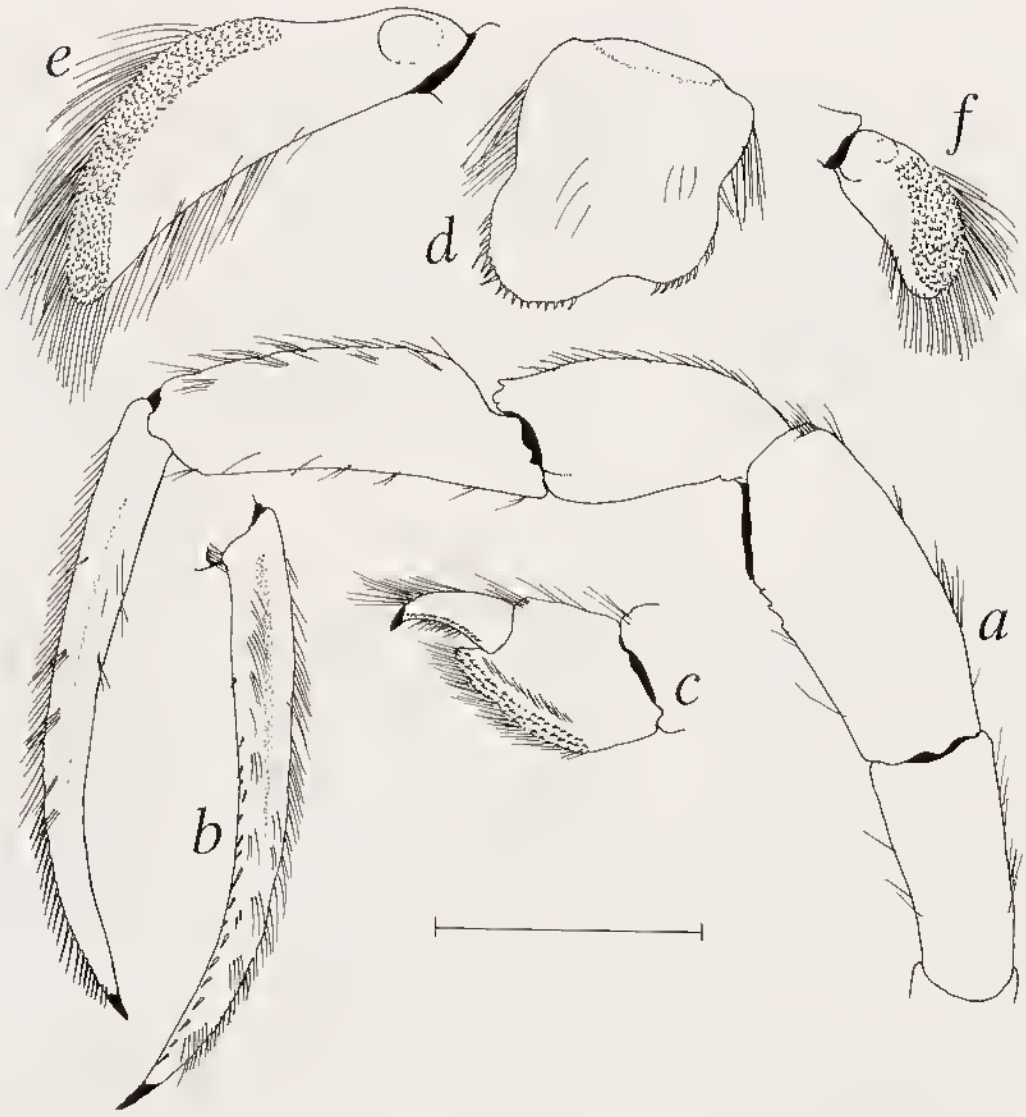

FIG. 12. — *Sympagurus trispinosus* (Balss, 1911), ♀ ovig. (11.9 mm), Tuamotu, Stn 309 (MNHN-Pg 5143) : **a**, third left pereopod, lateral view; **b**, dactyl of same, mesial view; **c**, propodus and dactyl of left fourth pereopod, lateral view; **d**, telson, dorsal view; **e**, exopod of left uropod, dorsal view; **f**, exopod of right uropod, dorsal view.
Scale equals 10 mm (a,b), and 5 mm (c-f).

Sympagurus wallisi sp. nov.

Figs 13-15, 27h-i, 28f

TYPE MATERIAL. — Holotype : **French Polynesia. Tuamotu.** Vanavana, Stn 331, 20°45.7'S, 139°10.1'W, trapped, 240 m, 28.X.1990, ♂ (11.0 mm) (MNHN-Pg 5144)

Paratypes : **French Polynesia. Tuamotu.** Takapoto, 14°40.'S, 145°15.2'W, 250 m, 7.VI.1989 : 1 ♂ (10.4 mm), 1 ♀ (5.6 mm), 1 ♀ ovig. (12.2 mm) (MNHN-Pg 5157). — Makemo, Stn 308, 16° 34.5'S, 143°39.9'W, trapped, 280 m, 7.X.1990 : 1 ♂ (12.5 mm), 1 ♀ ovig. (8.0 mm) (MNHN-Pg 5145). — Vanavana, Stn 331, 20°45.7'S, 139°10.1'W, trapped, 240 m, 28.X.1990 : 8 ♂ (4.6-11.4 mm), 1 ♀ (4.6 mm), 5 ♀ ovigs (7.3-9.9 mm) (MNHN-Pg 5146). — Fangataufa, Stn 231, 22°12.0'S, 138°45.9'W, trapped, 270 m, 21.V.1990 : 3 ♂ (11.5-11.9 mm), 2 ♀ (11.4, 11.8 mm) (USNM 265393). — Fangataufa, Stn 322, 22°12.9'S, 138°43.1'W, trapped, 250 m, 23.X.1990 : 2 ♂ (8.2, 10.0 mm) (MNHN-Pg 5147).

Source : MNHN, Paris

DESCRIPTION. — Shield (Fig. 13a) approximately as broad as long; dorsal surface weakly calcified on more than half of surface, with scattered short setae, and low blister-like tubercles medially. Rostrum broadly rounded, often obsolete, with short mid-dorsal ridge. Anterior margins sinuose. Lateral projections subtriangular, with terminal spine. Anterolateral margins sloping. Posterior margin broadly rounded. Anterodistal margin of branchiostegite rounded, unarmed, setose.

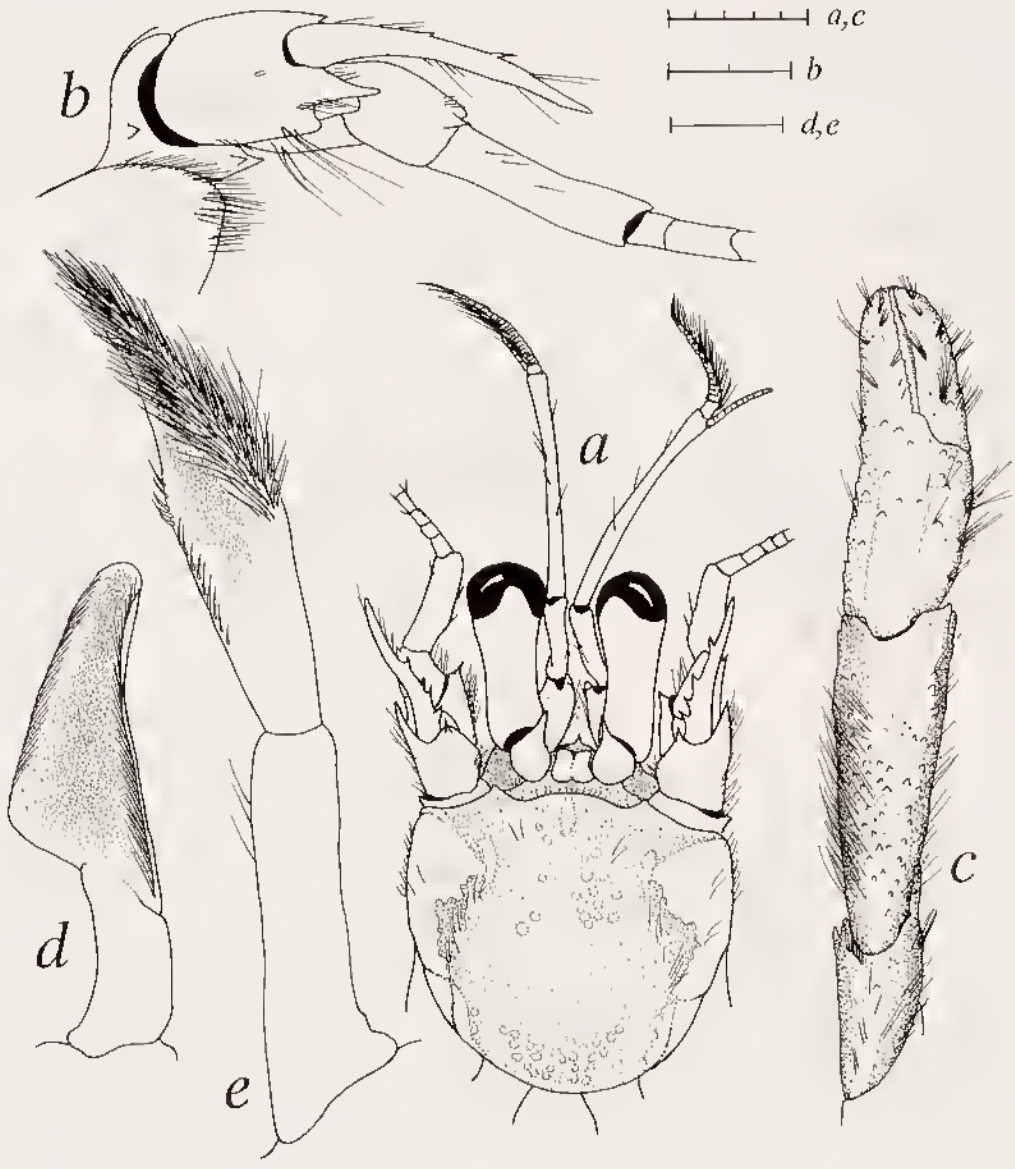

FIG. 13. — *Sympagurus wallisi* sp. nov., holotype ♂ (11.0 mm), Tuamotu, Stn 331 (MNHN-Pg 5144) : a, shield and cephalic appendages; b, right antennal peduncle, lateral view; c, left cheliped, dorsal view; d, male first left gonopod, mesial view; e, male second left gonopod, anterior view.
Scales equal 5 mm (a,c), 2 mm (b), and 1 mm (d,e).

Ocular peduncles more than half length of shield, naked. Cornea slightly dilated. Ocular acicles subtriangular, terminating in strong spine; separated basally by approximately basal width of 1 acicle.

Antennular peduncle long, slender, exceeding distal margin of corneae by nearly entire length of ultimate segment; ventral flagellum with 11 to 12 articles. Ultimate segment at least twice or more as long as penultimate

Source : MNHN, Paris

segment, with scattered setae. Basal segment with strong ventromesial spine; lateral face with distal subrectangular lobe armed or with 3 to 4 small spines, and strong spine proximally.

Antennal peduncle (Fig. 13a-b) exceeding distal margin of cornea by approximately 0.3 length of fifth segment. Flagellum long, exceeding extended right cheliped and ambulatory legs, articles with very short, inconspicuous setae. Fifth segment unarmed, with few setae on lateral, and row of bristle-like setae on mesial margin. Fourth segment armed with strong spine on dorsolateral distal angle. Third segment with strong ventromesial distal spine. Second segment with dorsolateral distal angle produced, terminating in strong, occasionally bifid spine; mesial margin with spine on dorsolateral distal angle. First segment with spine on lateral face; ventromesial angle produced, with 3 to 4 small spines laterally. Antennal acicles slightly curved outward (in dorsal view), usually not reaching to distal margin of corneae, terminating in strong spine; mesial margin armed with row 2 to 6 strong spines, setose.

Mandible (Fig. 14a) with 3-segmented palp. Maxillule (Fig. 14b-c) with external lobe of endopod weakly developed, internal lobe with 6 to 8 long setae. Maxilla (Fig. 14d) with endopod slightly exceeding distal margin of scaphognathite. First maxilliped (Fig. 14e) with endopod slightly exceeding exopod in distal extension. Second maxilliped (Fig. 14f) without distinguishing characters. Third maxilliped (Fig. 14g) slender, distal 3 segments (carpus, propodus and dactyl) each 3 times as long as wide; crista dentata formed of 9 to 10 corneous-tipped teeth;

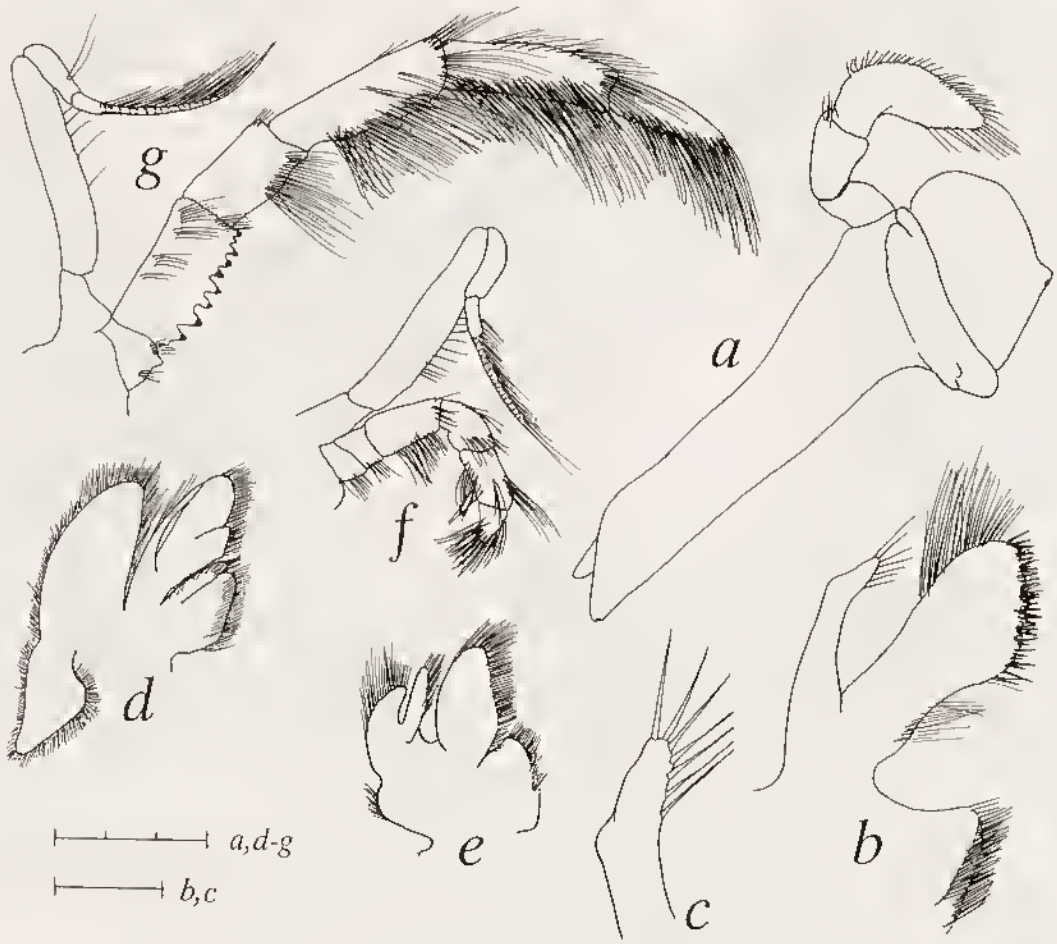

FIG. 14. — *Sympagurus wallisi* sp. nov., paratype ♂ (10.3 mm), Tuamotu, Stn 331 (MNHN-Pg 5146). Left mouthparts, internal view : **a**, mandible; **b**, maxillule; **c**, distal end of endopod of same; **d**, maxilla; **e**, first maxilliped; **f**, second maxilliped; **g**, third maxilliped.

Scales equal 3 mm (a,d-g), 1 mm (b), and 0.5 mm (c).

Source : MNHN, Paris

coxa and basis each with small mesial tooth. Sternite of third maxillipeds with small spine on each side of midline. Epistome with strong, straight spine. Labral spine present.

Chelipeds markedly dissimilar. Right cheliped (Fig. 27h-i, 28f) massive, with scattered short setae; dorsal surface of palm and carpus with some iridescence medially. Fingers curved ventromesially, terminating in small, usually blunt corneous claw; cutting edges with irregularly sized calcareous teeth; dorsal and ventral faces each with row of 3 to 4 tufts of setae parallel to cutting edge. Dactyl subequal in length to palm, and set at strongly oblique angle to longitudinal axis of palm; mesial margin broadly curved, well defined by row of blunt or sharp spines diminishing in size distally; dorsal face covered with strong mammilliform tubercles or spines, ventral face covered with low tubercles, ventromesial face concave. Fixed finger broad at base, dorsal and ventral surfaces similar to dactyl. Palm approximately as long as broad, lateral margin well delimited by row of blunt to sharp spines; mesial face rounded, with strong spines or tubercles; dorsal surface covered with well-spaced tubercles or spines; ventral surface smooth. Carpus with spines or tubercles on dorsal surface; dorsodistal margin with row of strong spines; ventromesial distal margin with row of small spines; ventral surface few low, blunt spines or tubercles. Merus with small dorsodistal spine; lateral and ventral faces with small tubercles or spines; ventromesial margin with row of small spines. Coxa and ischium with small spines on ventral face; coxa with ventromesial row of setae.

Left cheliped (Fig. 13c) well calcified, dorsal surface of carpus and palm with some iridescence medially. Fingers terminating in small corneous claws; dorsal and ventral surfaces unarmed but with several tufts of setae; cutting edge of dactyl with row of minute, fused corneous teeth; cutting edge of fixed finger with row of regularly spaced, small, evenly sized teeth. Dactyl subequal to palm in length. Palm with tufts of long setae on mesial face, and tufts of short setae on lateral face; dorsal surface with scattered setae and small tubercles or spines on distal half; ventral face smooth except for scattered setae. Carpus with moderately dense setae on dorsal and lateral faces, and strong dorsodistal spine; dorsal margin with irregular rows of small spines increasing in size distally; dorsolateral surface with well-spaced small spines at least on proximal half; ventral face with few tufts of setae medially and scattered setae elsewhere. Merus moderately setose, ventrolateral distal margin with row of spines; ventral face with small spines. Ischium with small spines on ventral face. Coxa unarmed but with ventromesial row of setae.

Ambulatory legs (Fig. 15a-c) similar from right to left, long, exceeding extended right cheliped by approximately 1/2 length of dactyl. Dactyl long, approximately 1.8 times as long as propodus, terminating in sharp corneous claw; with dorsomesial row of bristle-like setae, and ventromesial row of about 15 corneous spines; lateral and mesial faces each with shallow, longitudinal sulcus on proximal half (deeper on mesial face). Propodus with row of setae on dorsal margin. Carpus with small dorsodistal spine, and few setae dorsally. Merus with setae on dorsal margin; merus of second pereopods also with row of small spines on ventral margin. Ischium and coxa unarmed. Anterior lobe of sternite of third pereopods sloping, setose, usually unarmed, or occasionally with small spine.

Fourth pereopod (Fig. 15d-e) subchelate; merus, carpus, and propodus with low, blister-like tubercles on lateral faces. Dactyl subtriangular, terminating in sharp corneous claw (longer and more slender in females than in males), and ventrolateral row of small corneous spinules. Propodus longer than wide, rasp formed of 1 row of rounded scales. Carpus with long setae on dorsal margin. Merus with rows of long setae on dorsal and ventral margins.

Fifth pereopod (Fig. 15f) chelate, carpus and propodus with low, blister-like tubercles on lateral face. Propodal rasp extending to mid-length of segment.

Eleven pairs of intermediate branchiae (flattened branches weakly divided distally).

Uropods and telson (Fig. 15g) markedly asymmetrical. Telson with weak transverse suture; dorsal surface with numerous low, blister-like tubercles; posterior lobes separated by narrow cleft, terminal margin of lobes armed with corneous spines.

Male with paired first and second gonopods well developed. First gonopod (Fig. 13d) with concave distal lobe. Second gonopod (Fig. 13e) with low, blister-like tubercles on posterior face of distal and basal segments; distal segment setose on distomesial face, with short, bristle-like setae on lateral margin; basal segment with few setae on posterior face. Female with vestigial second right pleopod.

Source : MNHN, Paris

COLOR (Fig. 28f). — Shield orange-brown medially, cream yellow elsewhere. Ocular peduncles amber, cornea black centrally. Cephalic appendages and ocular acicles whitish. Right cheliped with white tubercles and spines on reddish to dark-pink background (bases of tubercles or spines darker than remaining surfaces); mesial face of palm and entire dorsal surface of carpus with darker coloration than other surfaces of cheliped. Left cheliped with chela red-spotted (spots at bases of tufts of setae) on whitish background; carpus with spines on reddish background. Second to fifth pereopods more or less uniformly pinkish.

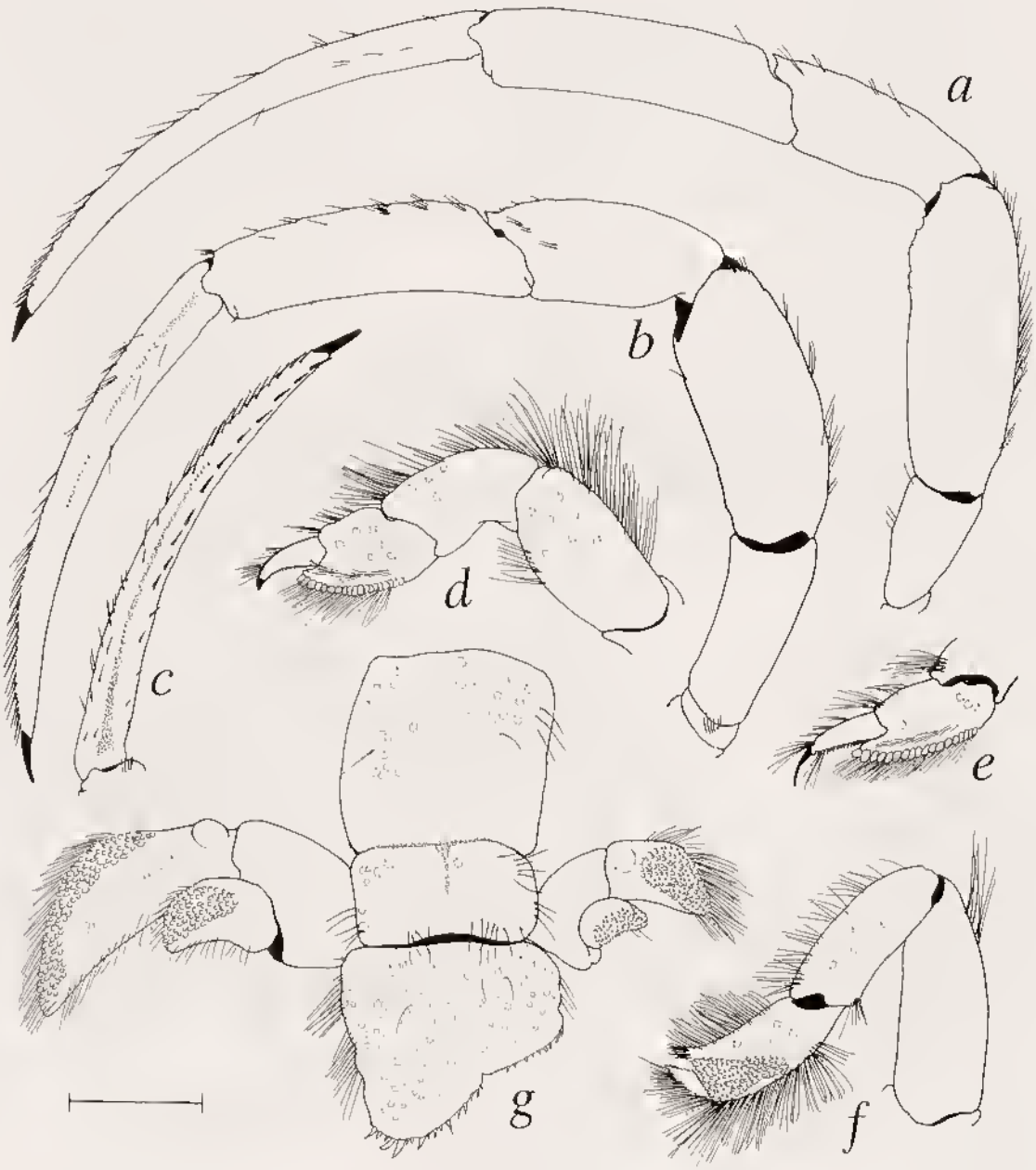

FIG. 15. — *Sympagurus wallisi* sp. nov. **a-d**, **f-g**, holotype ♂ (11.0 mm), Tuamotu, Stn 331 (MNHN-Pg 5144a) : **a**, second left pereopod, lateral view; **b**, third left pereopod, lateral view; **c**, dactyl of same, mesial view; **d**, fourth left pereopod (male), lateral view; **f**, fifth left pereopod, lateral view; **g**, tergite of sixth abdominal somite, telson and uropods, dorsal view. — **e**, paratype ♀ (11.4 mm), Tuamotu, Stn 231 (USNM 265393) : propodus and dactyl of left fourth pereopod (female), lateral view.

Scale equals 6 mm (a-c), and 3 mm (d-f).

Source : MNHN, Paris

HABITAT AND SYMBIOTIC ASSOCIATIONS. — Found inhabiting gastropod shells with a small unidentified actinian growing on the shell.

DISTRIBUTION. — Known so far only from French Polynesia. Depth : 240 to 280 m.

ETYMOLOGY. — The specific name is given in honor of Captain Samuel WALLIS, English navigator who commanded the first European expedition to reach the Tuamotu and Tahiti on board the *"Dolphin"* in the year 1767.

REMARKS. — This species most closely resembles *Sympagurus bougainvillei* sp. nov., and *S. diogenes* Whitelegge, 1900. The three can easily be separated by marked differences in coloration, most evident in the chelipeds and second and third pereopods. In *S. wallisi*, the dorsal surface of the right cheliped has a red to pinkish color (darker on carpus) with white tubercles or spines, the left cheliped is white with red spots, and the walking legs are pink (Fig. 28f). In *S. bougainvillei*, the dorsal surface of the cheliped and the walking legs are pink with small red spots; the carpus of the chelipeds and walking legs each have a large red spot on the mesial face and on the lateral face of the left cheliped and walking legs (Fig. 28g). In *S. diogenes*, the right and left chelipeds have white fingers, the dorsal surface of each palm is red or orange, usually iridescent, and fading to white laterally; the walking legs are orange fading to white towards the dactyls, and the carpi each have a narrow, dark red band proximally (MIYAKE, 1978 : 74, pl. 4, fig. 5; 1982 : 118, pl. 40, fig. 2; BABA *et al.*, 1986 : 196, fig. 145).

In the absence of coloration the three species can be separated (with caution) by the armature of the carpus and chela of the right cheliped (see Fig. 27g-j). In general, the armature of the right cheliped is strongest in *S. wallisi*, and weakest in *S. diogenes*. In *S. wallisi*, the dorsal surfaces of the fingers of the right chela are covered with strong mammilliform spines. The dorsal surfaces of the right fingers in *S. bougainvillei* have well-spaced small tubercles or spines, and in *S. diogenes*, at most, minute tubercles. In *S. wallisi*, the dorsodistal margin of the carpus has a row of strong spines, whereas in *S. bougainvillei* and *S. diogenes* the spines are small.

Sympagurus bougainvillei sp. nov.

Figs 16-19, 27j, 28g

TYPE MATERIAL. — Holotype : **French Polynesia. Tuamotu.** Makemo, Stn 308, 16°34.5'S, 143°39.9'W, trapped, 280 m, 7.X.1990, ♂ (11.9 mm) (MNHN-Pg 5148).

Paratypes : **Tuamotu.** Same locality as holotype : 2 ♂ (11.8-12.2 mm) (USNM 265394). — **Marquesas Islands.** Tahuata, Stn 300, 09°54.5'S, 139°07.9'W, trapped, 190 m, 1.IX.1990 : 1 ♂ (11.7 mm) (MNHN-Pg 5149).

DESCRIPTION. — Shield (Fig. 16a) approximately as broad as long; dorsal surface weakly calcified on more than half of surface, with scattered short setae, and inconspicuous, low blister-like tubercles. Rostrum broadly rounded, with short mid-dorsal ridge. Anterior margins weakly concave. Lateral projections subtriangular, with small subterminal spine. Anterolateral margins sloping. Posterior margin broadly rounded. Anterodistal margin of branchiostegite rounded, unarmed, setose.

Ocular peduncles more than half length of shield, with few setae on dorsal face. Cornea slightly dilated. Ocular acicles subtriangular, terminating in strong spine; separated basally approximately by slightly less than basal width of 1 acicle.

Antennular peduncle long, slender, exceeding distal margin of corneae by nearly entire length of ultimate segment, with few setae on dorsal face; ventral flagellum with 11 to 13 articles. Ultimate segment at least twice as long as penultimate, with scattered setae. Basal segment with strong ventromesial spine; lateral face with distal subrectangular lobe armed or with 1 to 3 small spines, and strong spine proximally.

Antennal peduncle (Fig. 16a-b) slightly exceeding distal margin of cornea. Flagellum long, exceeding extended right cheliped, articles with few short setae. Fifth segment unarmed, with few setae laterally, and row of bristle-like setae on mesial margin. Fourth segment with strong spine on dorsolateral distal angle. Third segment with strong ventromesial distal spine. Second segment with dorsolateral distal angle produced, terminating in strong, usually bifid spine often having small spine dorsally; mesial margin with spine on dorsolateral distal angle. First

Source : MNHN, Paris

segment with small spine on lateral face; ventromesial angle produced, with 3 to 4 small spines laterally. Antennal acicles slightly curved outward (in dorsal view), reaching distal margin of corneae, terminating in strong spine; mesial margin setose, armed with row 6 to 8 strong spines.

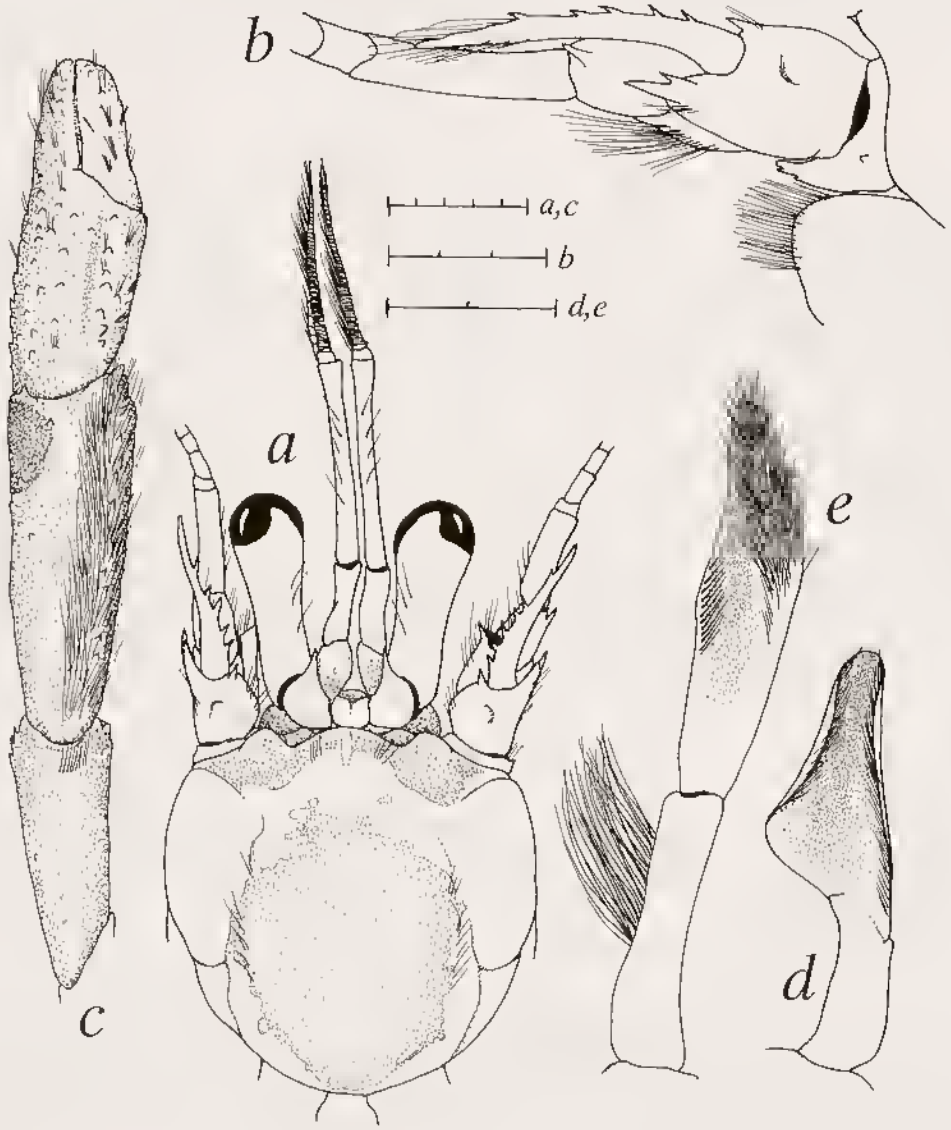

FIG. 16. — *Sympagurus bougainvillei* sp. nov., holotype ♂ (11.9 mm), Tuamotu, Stn 308 (MNHN-Pg 5148) : **a**, shield and cephalic appendages; **b**, left antennal peduncle, lateral view; **c**, left cheliped, dorsal view; **d**, male first left gonopod, mesial view; **e**, male second left gonopod, anterior view.
Scales equal 5 mm (a,c), 3 mm (b), and 2 mm (d,e).

Mandible (Fig. 17a) with 3-segmented palp. Maxillule (Fig. 17b-c) with external lobe of endopod weakly to moderately developed, internal lobe with 5 to 8 long setae. Maxilla (Fig. 17d) with endopod exceeding distal margin of scaphognathite. First maxilliped (Fig. 17e) with endopod exceeding exopod in distal extension. Second maxilliped (Fig. 17f) without distinguishing characters. Third maxilliped (Fig. 17g) slender, distal 3 segments each 3 times as long as wide; crista dentata with 9 to 11 corneous-tipped teeth; coxa and basis each with small mesial tooth. Sternite of third maxillipeds with small spine on each side of midline. Epistomial spine absent. Labral spine present.

Source : MNHN, Paris

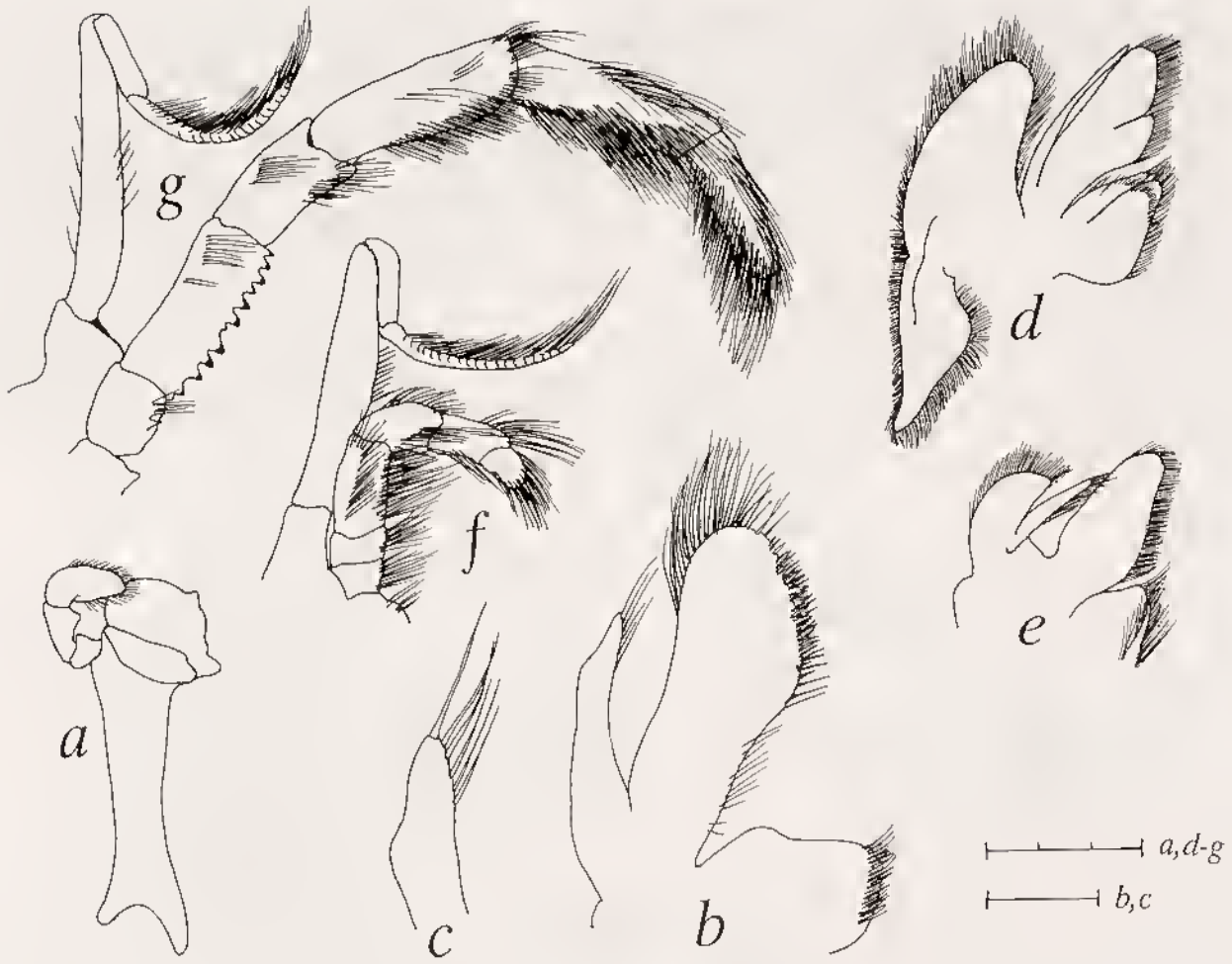

FIG. 17. — *Sympagurus bougainvillei* sp. nov., holotype ♂ (11.9 mm), Tuamotu, Stn 308 (MNHN-Pg 5148). Left mouthparts, internal view : a, mandible; b, maxillule; c, distal end of endopod of same; d, maxilla; e, first maxilliped; f, second maxilliped; g, third maxilliped.
Scales equal 3 mm (a,d-g), 1 mm (b), and 0.5 mm (c).

Chelipeds markedly dissimilar. Right cheliped (Fig. 27j, 28g) massive, chela sparsely setose, carpus with dense short setae dorsally. Fingers curved ventromesially, terminating in small, usually blunt corneous claw; cutting edges with 2 large calcareous teeth and small, subequal teeth; dorsal and ventral faces with well-spaced small spines, and scattered tufts of setae; with row of tufts of short setae close to, and parallel to cutting edge on dorsal and ventral faces. Dactyl subequal in length to palm, set at strongly oblique angle to longitudinal axis of palm; mesial margin broadly curved, well defined by row of spines; ventromesial face concave, ventral face smooth. Fixed finger broad at base. Palm approximately as long as broad, or slightly longer than broad in large specimens (shield length > 11.0 mm); lateral margin well delimited by row of spines; mesial face rounded, with well-spaced spines or tubercles; dorsal surface covered with well-spaced, small spines; ventral surface smooth. Carpus covered with small spines or tubercles on all faces; dorsodistal and ventromesial distal margins each with row of small spines. Merus with lateral and ventral surfaces covered with small tubercles or spines; ventromesial distal margin with row of spines. Coxa and ischium with small spines on ventral face; coxa with ventromesial row of long setae.

Left cheliped (Fig. 16c) well calcified. Fingers terminating in small corneous claws; dorsal and ventral surfaces unarmed except for tufts of setae; cutting edge of dactyl with row of minute, fused corneous teeth; cutting edge of fixed finger with row of regularly-spaced, small, evenly-sized calcareous teeth interspersed with small corneous

Source : MNHN, Paris

teeth. Dactyl subequal to palm in length. Palm with tufts of setae on dorsomesial and dorsolateral faces, and dorsomesial row of small spines; dorsolateral face with small tubercles or spines; ventral face smooth except for scattered setae. Carpus with dense setae dorsally, and strong dorsodistal spine; dorsal margin with row of small spines (obscured by setae); mesial and ventral faces smooth. Merus with row of spines on ventrolateral and ventromesial distal margins. Ischium unarmed ventrally. Coxa unarmed, with ventromesial row of long setae.

Ambulatory legs (Fig. 18a-c) similar from right to left, long, usually exceeding extended right cheliped by as much as 2/3 length of dactyl, reaching tip of extended right cheliped in large specimens (shield length > 11.0 mm). Dactyl long, broadly curved, approximately 1.8 times as long as propodus, terminating in sharp corneous claw; with dorsomesial and dorsolateral rows of bristle-like setae, and ventromesial row of about 14 corneous spines; lateral and mesial faces with shallow, longitudinal sulcus on proximal half (deeper on mesial face). Propodus with row of setae on dorsal margin; with ventrolateral row of tufts of short setae. Carpus with small dorsodistal spine, and few setae on dorsal margin. Merus with few setae on dorsal margin; merus of second pereopods with row of small spines on ventral margin distally. Ischium and coxa unarmed. Anterior lobe of sternite of third pereopods sloping, setose, unarmed.

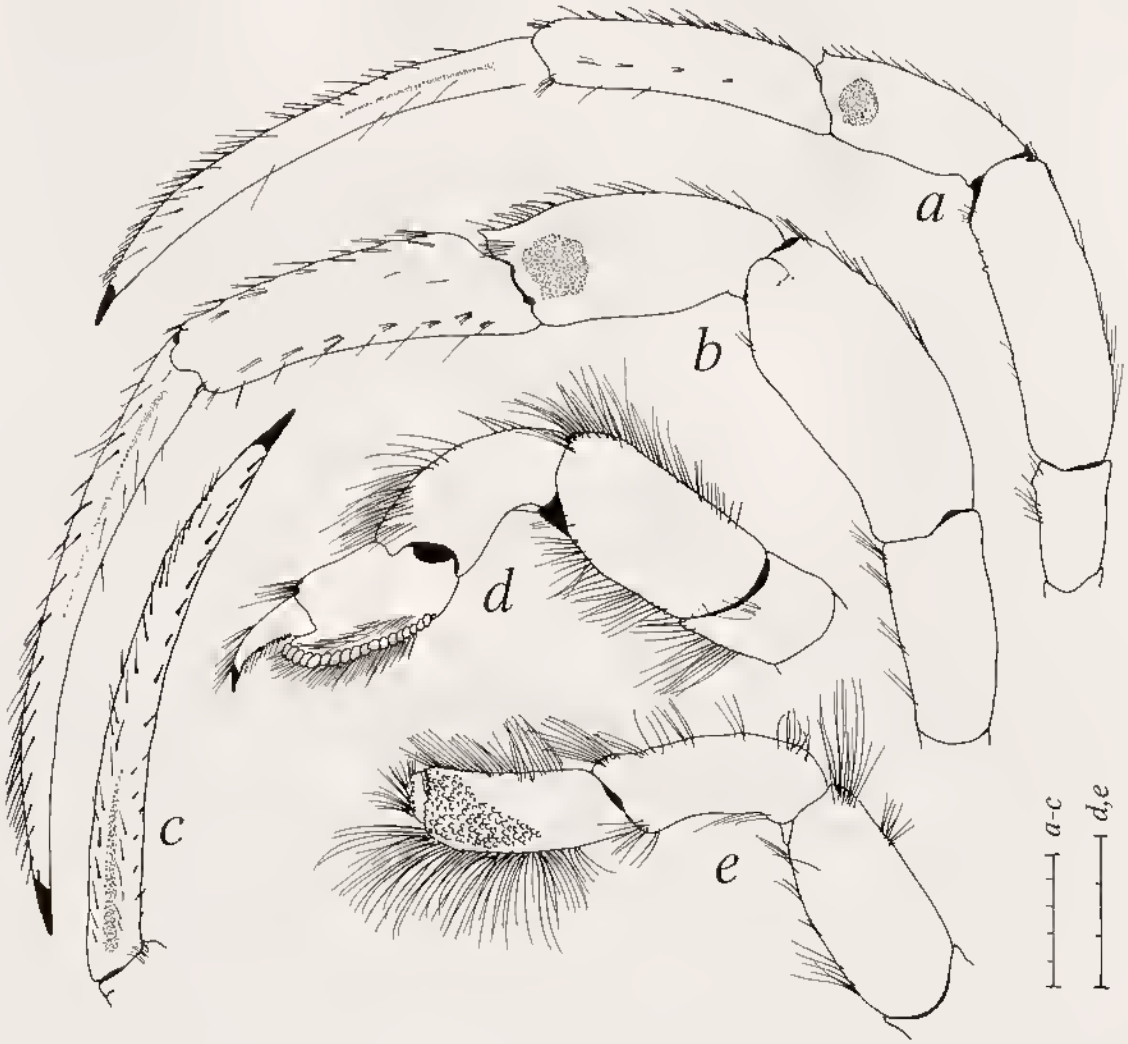

FIG. 18. — *Sympagurus bougainvillei* sp. nov., holotype ♂ (11.9 mm), Tuamotu, Stn 308 (MNHN-Pg 5148) : **a**, second left pereopod, lateral view; **b**, third left pereopod, lateral view; **c**, dactyl of same, mesial view; **d**, fourth left pereopod, lateral view; **e**, fifth left pereopod, lateral view.

Scales equal 5 mm (a-c), and 3 mm (d,e). Stippled area shown in "a" and "b" indicates red color pattern.

Source : MNHN, Paris

Fourth pereopod (Fig. 18d) subchelate; merus, carpus, and propodus with inconspicuous low, blister-like tubercles on lateral faces. Dactyl subtriangular, terminating in sharp corneous claw; with ventrolateral row of small corneous spinules. Propodus longer than wide, rasp formed of 1 row of rounded scales. Carpus with long setae on dorsal margin. Merus with rows of long setae on dorsal and ventral margins.

Fifth pereopod (Fig. 18e) chelate, carpus and propodus with inconspicuous low, blister-like tubercles on lateral faces. Propodal rasp extending to mid-length of segment.

Eleven pairs of intermediate branchiae (flattened branches weakly divided distally).

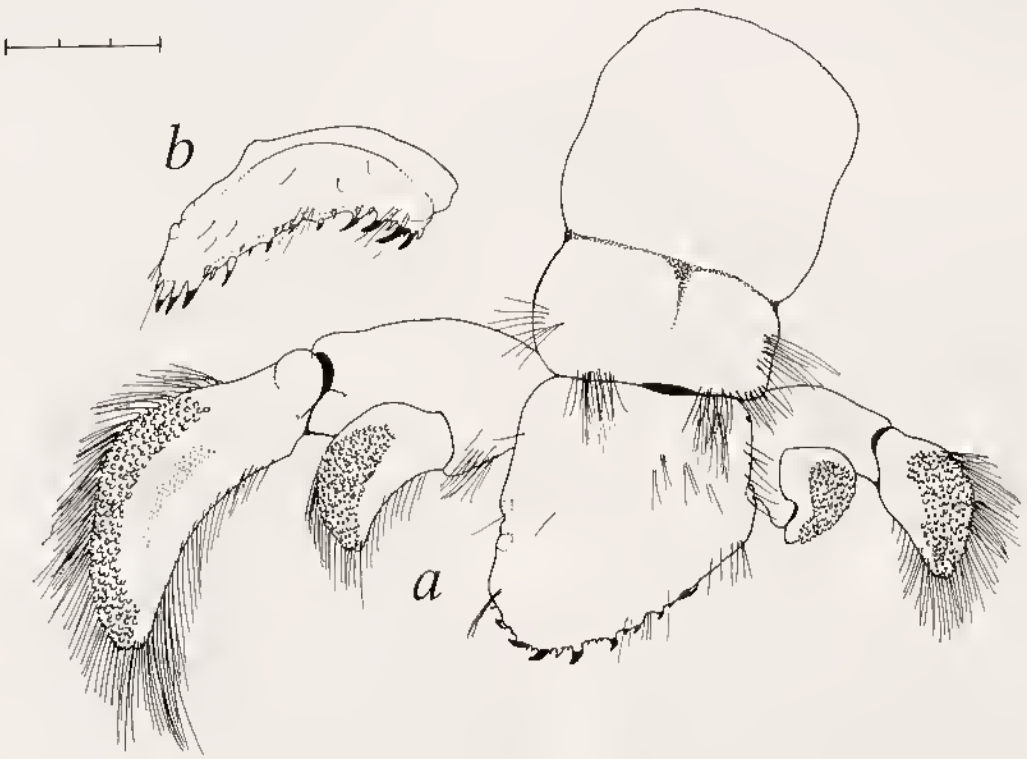

FIG. 19. — *Sympagurus bougainvillei* sp. nov., holotype ♂ (11.9 mm), Tuamotu, Stn 308 (MNHN-Pg 5148) : **a**, tergite of sixth abdominal somite, telson and uropods, dorsal view; **b**, telson, posterior view.
Scale equals 3 mm.

Uropods and telson (Fig. 19) markedly asymmetrical. Telson with weak (often obsolete) transverse suture; dorsal surface with inconspicuous low, blister-like tubercles; posterior lobes separated by narrow cleft, terminal margins of lobes armed with strongly curved corneous spines, curved ventrally and laterally, spines on right lobe often not entirely visible in dorsal view.

Male with paired first and second gonopods well developed. First gonopod (fig. 16d) with concave distal lobe. Second gonopod (Fig. 16e) with low, blister-like tubercles on posterior face of distal and basal segments; distal segment setose on distomesial face, and long, bristle-like setae on mid-lateral margin; basal segment with long setae on posterior face. Female with vestigial second right pleopod.

COLOR (Fig. 28g). — Shield white except for light orange region medially; with orange-red spots more numerous on calcified surfaces. Ocular peduncles light orange, cornea with light blue tinge. Cephalic appendages and ocular acicles whitish or light orange. Right cheliped with chela and merus white with small orange spots; carpus orange with large, dark, orange-red spot on mesial face distally. Left cheliped with chela, carpus, and merus white with small orange spots; carpus with large dark orange spot on lateral and mesial faces distally. Second to fifth pereopods white with small orange spots; carpi with large, dark orange-red spot on lateral and mesial faces distally. Abdominal tergites and telson with small orange spots.

Source : MNHN, Paris

HABITAT AND SYMBIOTIC ASSOCIATIONS. — Found inhabiting gastropod shells with an unidentified actinian growing on the shell.

DISTRIBUTION. — Known so far only from French Polynesia. Depth : 190 to 280 m.

ETYMOLOGY. — The specific name is in honor of Captain Louis Antoine DE BOUGAINVILLE, French navigator and explorer who reached the Tuamotus and Tahiti on board *"La Boudeuse"*, just a few months after the English Captain Samuel WALLIS.

REMARKS. — (see *Sympagurus wallisi* sp. nov.)

Sympagurus poupini sp. nov.

Figs 20-23, 27k, 28h

Parapagurus dofleini - POUPIN *et al.*, 1990 : 94 (in part), pl. 11-f (see Remarks).
Sympagurus sp. nov. - POUPIN, 1993 : 51.

TYPE MATERIAL. — Holotype : **French Polynesia. Tuamotu.** Makemo, Stn 309, 16°34,2'S, 143°38,7'W, trapped, 580 m, 7.X.1990 : ♂ (18.5 mm) (MNHN-Pg 5150).

Paratypes : trapped, 300-600 m, 4.VI.1988 : 3 ♂ (10.3-19.1 mm), 1 ♀ (13.4 mm) (MNHN Pg. 4452). — Same locality as holotype : 9 ♂ (15.6-20.2 mm), 1 ♀ (15.5 mm) (USNM 265395).

ADDITIONAL MATERIAL EXAMINED. — **Western Samoa.** Radiale Apolima, trapped, 400 m, 17.XI.1977 : 1 ♂ (21.1 mm) (MNHN-Pg 5151).

Wallis Island. MUSORSTOM 7 : Stn CP 600, 12°32'S, 174°18'W, 500 m, 24.V.1992, : 2 ♂ (8.6, 9.0 mm) (MNHN-Pg 5152).

DESCRIPTION. — Shield (Fig. 20a) broader than long; dorsal surface weakly and irregularly calcified, with scattered setae. Rostrum triangular, with short mid-dorsal ridge. Anterior margins weakly concave. Lateral projections broadly subtriangular, with small terminal spine. Anterolateral margins slightly sloping. Posterior margin broadly rounded. Anterodistal margin of branchiostegite rounded, unarmed.

Ocular peduncles short, less than half length of shield, naked. Cornea slightly dilated. Ocular acicles subtriangular, terminating in strong spine; separated basally by approximately basal width of 1 acicle.

Antennular peduncle long, slender, exceeding distal margin of corneae by length of ultimate segment; ventral flagellum with 8 articles. Ultimate segment approximately 1.5 times or more as long as penultimate segment, with scattered setae. Basal segment with strong ventromesial spine on lateral face, distal subrectangular lobe unarmed or with 1 small spine and strong spine proximally.

Antennal peduncle (Fig. 20a, c) exceeding distal margin of cornea by about 0.3 length of fifth segment. Flagellum long, reaching to tip of fingers of extended right cheliped, naked or with scattered short setae. Fifth segment unarmed, with few setae on lateral and mesial margins. Fourth segment unarmed. Third segment with strong ventromesial distal spine. Second segment with dorsolateral distal angle produced, terminating in strong, multifid spine (usually trifid); mesial margin unarmed, dorsolateral distal angle setose. First segment unarmed; ventromesial angle produced, with 3-4 small spines laterally. Antennal acicles (Fig. 20a-b) nearly straight, exceeding distal margin of cornea by about 0.5 length of acicle, terminating in strong spine; mesial margin armed with row small blunt or sharp spines, setose.

Mandible (Fig. 21a) with 3-segmented palp. Maxillule (Fig. 21b-c) with external lobe of endopod weakly developed, internal lobe with 4 long setae. Maxilla (Fig. 21d) with endopod slightly exceeding distal margin of scaphognathite. First maxilliped (Fig. 21e) with endopod slightly exceeding exopod in distal extension. Second maxilliped (Fig. 21f) without distinguishing characters. Third maxilliped (Fig. 21g) with crista dentata of 11 corneous-tipped teeth increasing in size proximally; basis with mesial tooth; coxa with 2 small spines mesially. Sternite of third maxillipeds with small spine on each side of midline. Epistome unarmed or with short, straight spine. Labral spine present.

Source : MNHN, Paris

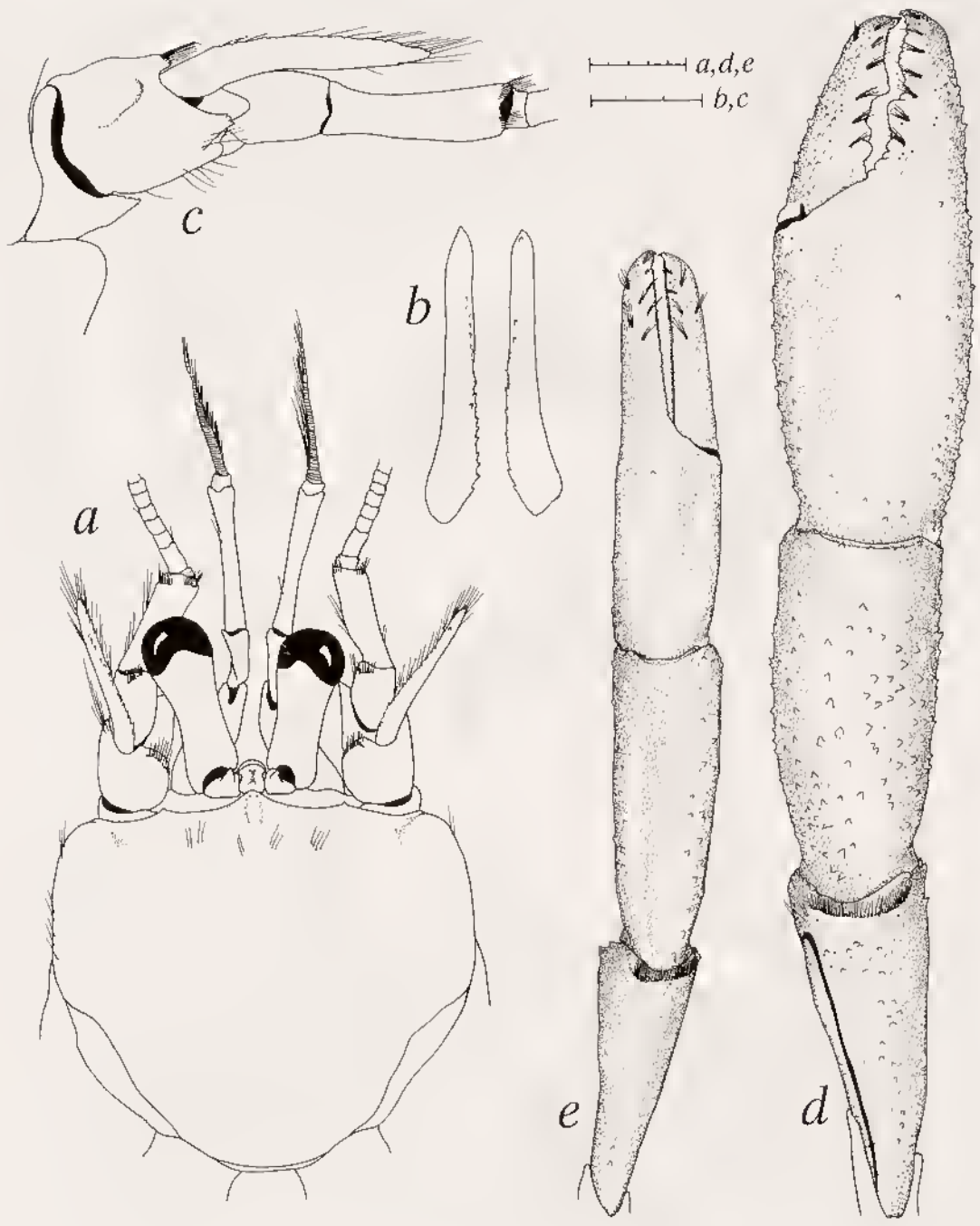

FIG. 20. — *Sympagurus poupini* sp. nov., Tuamotu, Stn 309. **a-c**, holotype ♂ (18.5 mm) (MNHN-Pg 5150) : **a**, shield and cephalic appendages; **b**, antennal acicles, dorsal view; **c**, right antennal peduncle, lateral view. — **d-e**, paratype ♂ (15.9 mm) (USNM 265395) : **d**, denuded right cheliped, dorsal view; **e**, denuded left cheliped, dorsal view.

Scales equal 5 mm (a,d,e), and 3 mm (b,c).

Chelipeds markedly dissimilar. Right cheliped (Fig. 20d, 27k, 28h) elongated, covered with dense setae obscuring surfaces of merus, carpus, palm, and proximal half of fingers. Fingers inwardly curved at tips, and terminating in small corneous claw crossed when closed; cutting edges with irregularly sized calcareous teeth;

Source : MNHN, Paris

dorsal and ventral faces with row of tufts of setae parallel to cutting edges. Dactyl subequal in length to palm, armed dorsomesially and ventromesially with small spines. Fixed finger armed dorsolaterally and ventrolaterally with small spines. Palm distinctly longer than broad (about 1.6 times), mesial and lateral faces rounded, armed with small spines; dorsal and ventral faces smooth except for few scattered small tubercles. Carpus with dorsal, lateral, and mesial faces armed with small, well-spaced spines; ventral face smooth except for scattered small tubercles or spines. Merus with transverse row of setae near dorsodistal margin; surfaces unarmed except for few small tubercles on dorsolateral face; ventromesial and ventrolateral margins armed with spines and tubercles. Ischium with ventral face armed with small spines. Coxa with setose ventromesial margin.

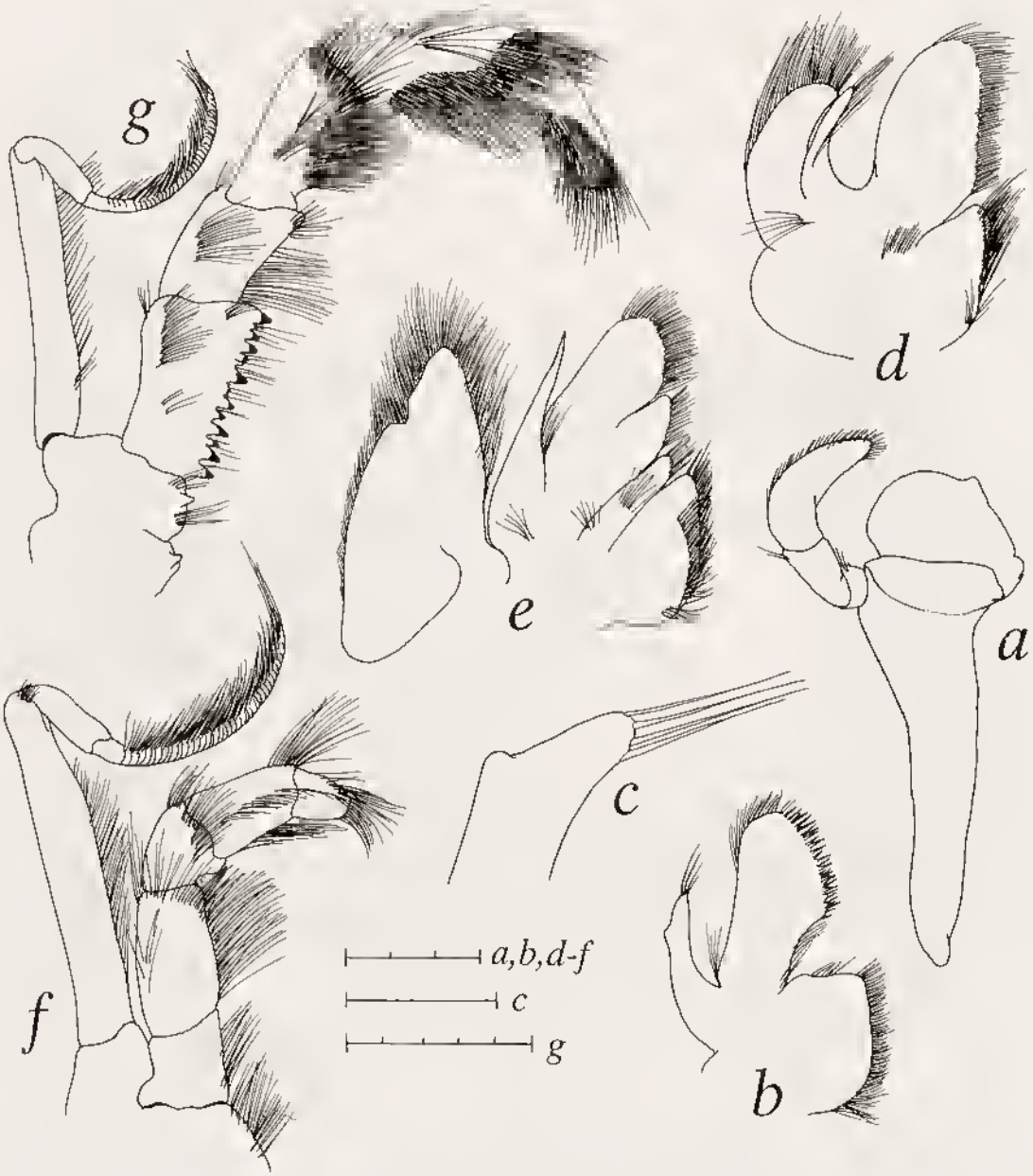

FIG. 21. — *Sympagurus poupini* sp. nov., holotype ♂ (18.5 mm), Tuamotu, Stn 309 (MNHN-Pg 5150). Left mouthparts, internal view : **a**, mandible; **b**, maxillule; **c**, distal end of endopod of same; **d**, maxilla; **e**, first maxilliped; **f**, second maxilliped; **g**, third maxilliped.

Scales equal 3 mm (a,b,d-f), 1 mm (c), and 5 mm (g).

Source : MNHN, Paris

Left cheliped (Fig. 20e) evenly calcified, covered with dense setae obscuring surfaces of merus, carpus, palm, and proximal half of fingers. Fingers terminating in small corneous claws crossed when closed; dorsal and ventral surfaces with scattered tufts of setae. Fixed finger with dorsal and ventral surfaces unarmed; cutting edge with evenly-sized, small calcareous teeth interspersed with small, fused corneous spinules. Dactyl subequal in length to palm; cutting edge with row of small, fused corneous spinules; dorsal and ventral surfaces unarmed. Palm smooth, except for few scattered small tubercles on lateral face proximally. Carpus with well-spaced, small spines on dorsal margin and dorsomesial face; ventrolateral distal margin with row of small spines. Merus with transverse row of setae near dorsodistal margin; surfaces unarmed except for row of small spines on ventrolateral and ventromesial margins. Ischium with ventral face armed with small spines. Coxa with setose ventromesial margin.

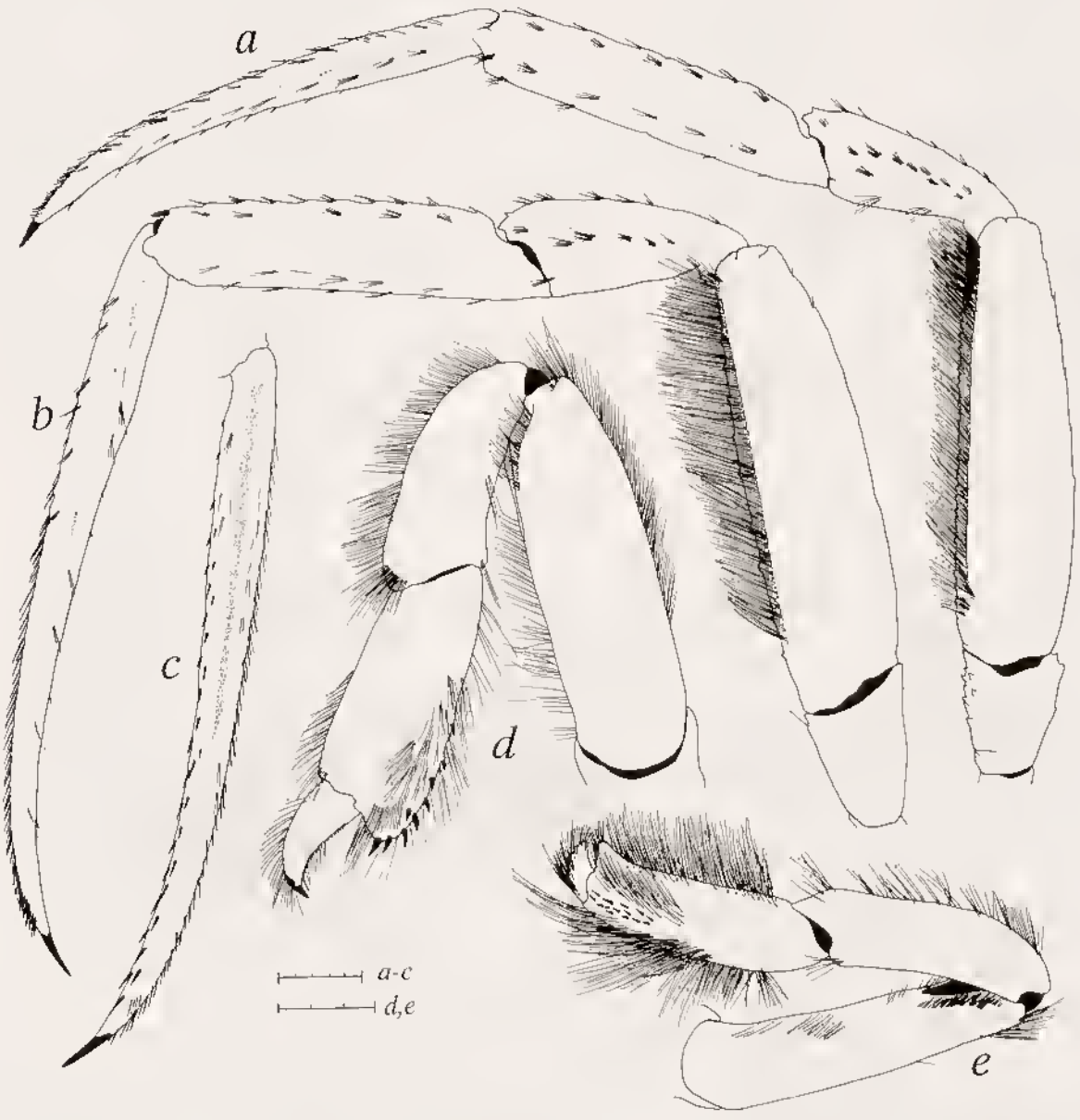

FIG. 22. — *Sympagurus poupini* sp. nov., holotype ♂ (18.5 mm), Tuamotu, Sta 309 (MNHN-Pg 5150) : **a**, second left pereopod, lateral view; **b**, third left pereopod, lateral view; **c**, dactyl of same, mesial view; **d**, fourth left pereopod, lateral view; **e**, fifth left pereopod, lateral view.
Scales equal 5 mm (a-c), and 3 mm (d,e).

Source : MNHN, Paris

Ambulatory legs (Fig. 22a-c) similar from right to left, long, reaching to tips of fingers of extended right cheliped. Dactyl long, approximately 1.7 times as long as propodus (second pereopod), or 2.2 times as long as propodus (third pereopod), terminating in sharp corneous claw; ventral margin armed with irregular row of about 25 to 30 small corneous spines; dorsal margin with row of bristle-like setae; lateral and mesial faces with shallow, longitudinal sulcus on proximal half (deeper on mesial face). Propodi with row of short bristles-like setae on dorsal and ventral margins, and dorsolateral and ventrolateral rows of tufts of short setae. Carpus with small dorsodistal spine, row of bristle-like setae dorsally, and row of tufts of short setae medially on lateral face. Merus with short setae on dorsal margin, distinct ventrolateral fringe of long setae, and row of blunt to sharp tubercles on ventral margin (tubercles more numerous on second pereopod). Ischium armed with spines on ventral face (second pereopod), or unarmed (third pereopod). Coxae unarmed. Anterior lobe of sternite of third pereopods sloping, setose, armed with 1 or 2 strong spines.

Fourth pereopod (Fig. 22d) subchelate. Dactyl subtriangular, terminating in sharp corneous claw, and ventrolateral row of small corneous spinules. Propodus elongate, more than twice as long as wide, rasp formed of 7 to 12 well-spaced, corneous spines. Carpus with setae on dorsal margin. Merus with rows of setae on dorsal and ventral margins.

Fifth pereopod (Fig. 22e) chelate. Propodus long, more than 3 times as long as wide; propodal rasp formed of 10 to 15 well-spaced, small corneous spines.

Twelve pairs of branchiae: eleven pairs of intermediate branchiae, and 1 pair of vestigial pleurobranchs on last thoracic somite.

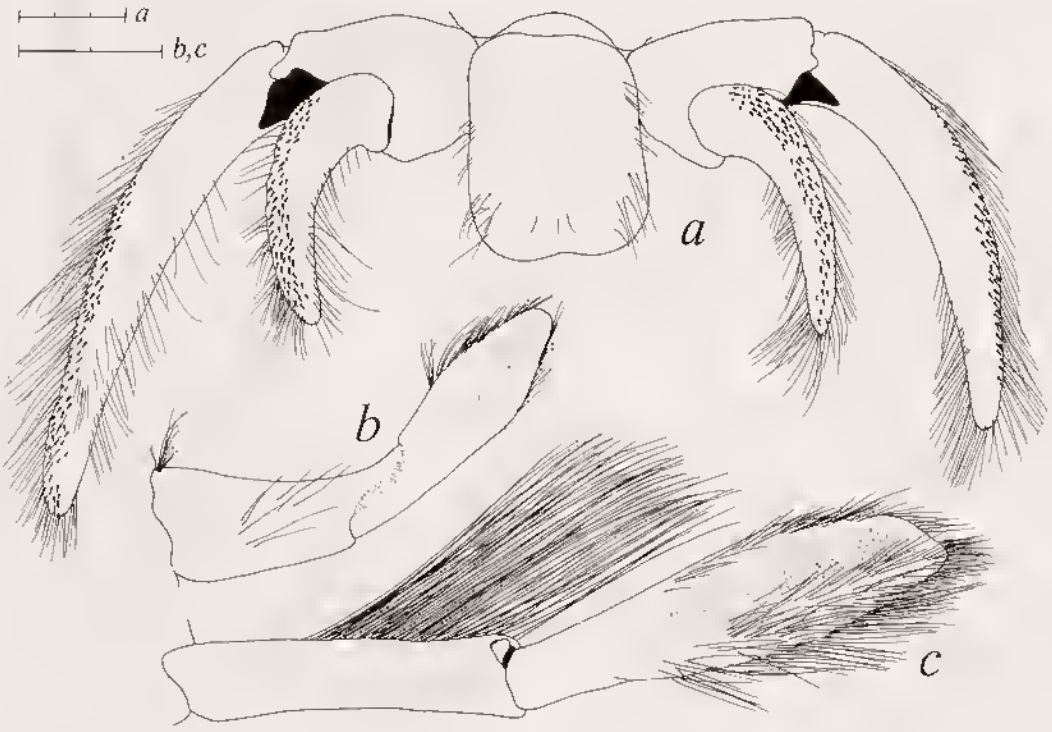

FIG. 23. — *Sympagurus poupini* sp. nov., holotype ♂ (18.5 mm), Tuamotu, Stn 309 (MNHN-Pg 5150) : a, uropods and telson, dorsal view; b, male first left gonopod, mesial view; c, male second left gonopod, anterior view. Scales equal 3 mm (a), and 2 mm (b,c).

Uropods and telson (Fig. 23a) symmetrical or nearly so. Uropods with endopod and exopod very elongated, exopod approximately 7.5 times as long as wide, endopod approximately 4.5 as long as wide; rasps of exopod and endopod formed of 3 to 4 rows of small corneous spines. Telson lacking transverse suture, dorsal surface with scattered setae; posterior margin faintly bilobed, unarmed.

Source : MNHN, Paris

Male with paired first and second gonopods well developed. First gonopod (Fig. 23b) with moderately concave distal lobe. Second gonopod (Fig. 23c) usually with small exopod on left side; distal segment setose on lateral and mesial margins. Female often with paired rudimentary first pleopods; with vestigial second right pleopod.

COLOR (Fig. 28h). — Overall color cream yellow. Dactyls and propodi of walking legs with white stripe faintly visible.

HABITAT AND SYMBIOTIC ASSOCIATIONS. — All specimens found living with an undetermined species of actinian entirely covering the abdomen of the hermit crab.

DISTRIBUTION. — Known so far only from French Polynesia. Depth : 300 to 600 m.

ETYMOLOGY. — The specific name is given in recognition of Mr Joseph POUPIN, whose careful collecting efforts are providing carcinologists with a wealth of information on the crustacean fauna from French Polynesia.

REMARKS. — (See also *Sympagurus dofleini* Balss, 1912). This is a species that can attain a large size, measuring up to 170 mm in extended body length (from tip of dactyls to telson). The chelipeds of this species and those of *S. dofleini* are similarly covered with dense setae. Otherwise, however, the two species differ markedly. In *S. poupini*, the meri of the walking legs are at least three times as long as broad, and each has a distinct longitudinal fringe of long setae; the propodus of the fourth pereopod has a weakly developed rasp formed of a few well-spaced corneous spines; and the uropods and telson are symmetrical, the uropodal rami are very long and slender, and the telson is unarmed. In contrast, in *S. dofleini*, the meri of the walking legs are twice as long as broad and naked, or at most with scattered setae; the propodus of the fourth pereopod has a well developed rasp consisting of three to four rows of conical scales; the uropods and telson are asymmetrical, and the telson is armed.

Sympagurus tuamotu sp. nov.

Figs 24-26, 28i

MATERIAL EXAMINED. — Holotype : **French Polynesia. Tuamotu**, Tureia, Stn 336, 20°46.2'S, 138°34.6'W, trapped, 760 m, 29.X.1990 : ♀ (3.7 mm) (MNHN-Pg 5153).

Paratypes : **French Polynesia. Austral Islands**, Raivavae, Stn D 66, 23°50.54'S, 147°42.73'W, trapped, 400 m, 3.XII.1990 : 1 ♂ (SI 3.4 mm) (MNHN-Pg 5154); 1 ♀ (2.1 mm) (USNM 265396).

DESCRIPTION. — Shield (Fig. 24a) as broad as long; dorsal surface with weakly calcified areas, and scattered short setae. Rostrum broadly rounded, weakly produced, and with short mid-dorsal ridge. Anterior margins weakly concave. Lateral projections subtriangular, terminating bluntly or acutely. Anterolateral margins sloping. Posterior margin broadly rounded. Ventrolateral margins of shield each with small spine (not visible in dorsal view). Anterodistal margin of branchiostegite rounded, unarmed, setose.

Ocular peduncles more than half length of shield, with dorsal row of setae. Cornea weakly dilated. Ocular acicles subtriangular, terminating in strong spine; separated basally by less than basal width of 1 acicle.

Antennular peduncle long, slender, exceeding distal margin of cornea by entire length of ultimate segment; ventral flagellum with 5 to 6 articles. Ultimate segment twice as long as penultimate segment, with scattered setae. Basal segment with strong ventromesial spine; lateral face with distal subrectangular lobe armed or with 1 or 2 small spines, and strong spine proximally.

Antennal peduncle (Fig. 24a-b) reaching distal margin of cornea. Flagellum long, exceeding extended right cheliped and ambulatory legs, articles with numerous setae < 1 to 2 flagellar articles in length (Fig. 24c). Fifth segment unarmed, but with scattered setae. Fourth segment with strong spine on dorsolateral distal angle. Third segment with strong ventromesial distal spine. Second segment with dorsolateral distal angle produced, terminating in strong, simple or trifid spine (occasionally with 1-3 small spines dorsally); mesial margin with spine on dorsolateral distal angle. First segment with 1 or 2 small spines on lateral face; ventromesial angle produced, with 3 to 4 small spines laterally. Antennal acicles slightly curved outward (in dorsal view), at most

Source : MNHN, Paris

slighlly exceeding distal margins of corneae, terminating in strong spine; mesial margin armed with row 11 to 12 spines (6-8 spines in small specimens shield length < 2.1 mm), selose.

Mandible (Fig. 25a) with 3-segmented palp. Maxillule (Fig. 25b) with external lobe of endopod weakly developed, internal lobe with 3 long, well-spaced setae. Maxilla (Fig. 25c) with endopod exceeding distal margin of scaphognathite. First maxilliped (Fig. 25d) with endopod exceeding exopod in distal extension. Second maxilliped (Fig. 25e) without distinguishing characters. Third maxilliped (Fig. 25f) with crista dentata of 7 corneous-tipped teeth; coxa with 2 teeth mesially, basis with 1 tooth mesially. Sternite of third maxillipeds with small spine on each side of midline. Epistome with long, slender spine strongly curved upward.

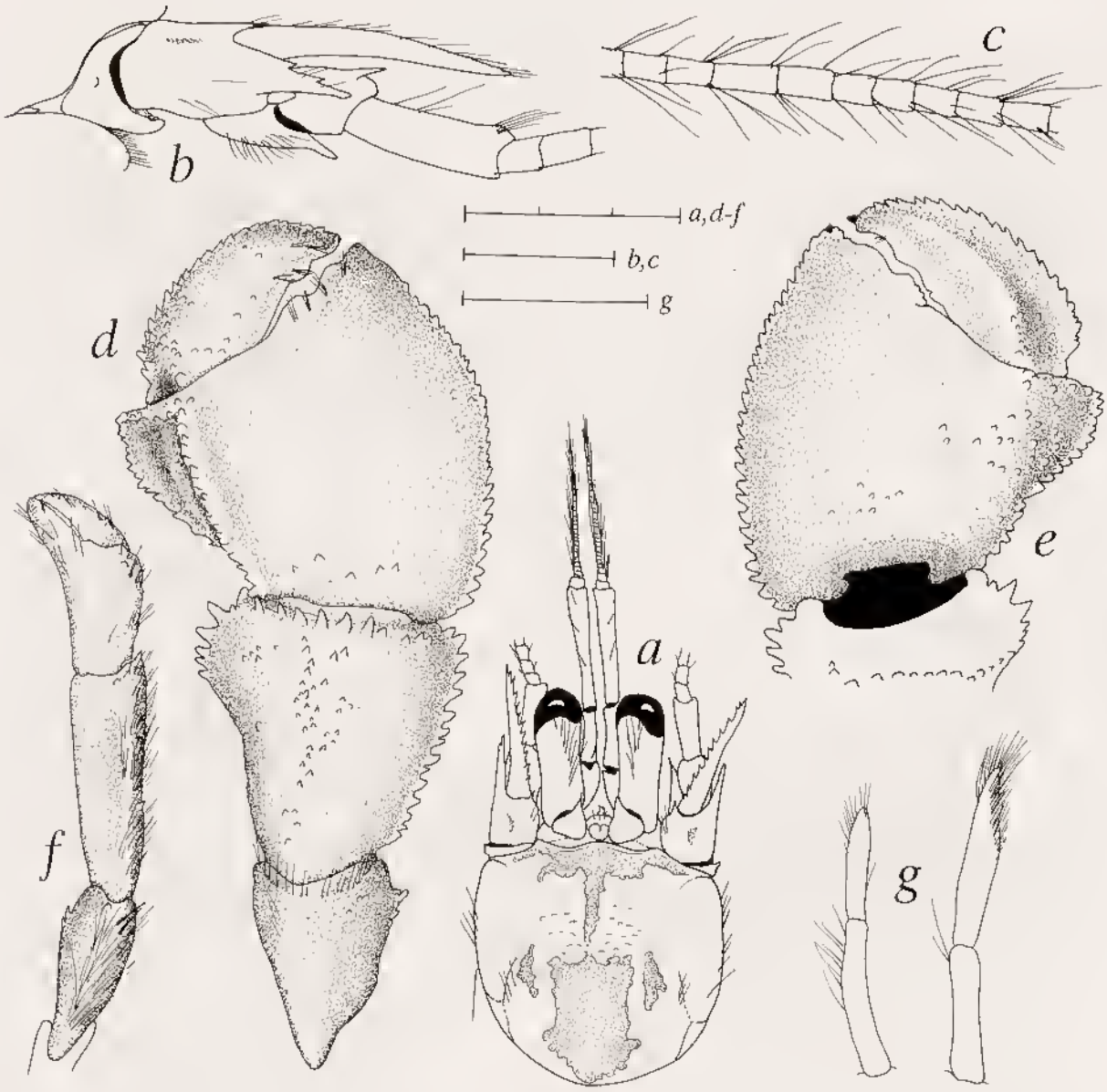

FIG. 24. — *Sympagurus tuamotu* sp. nov. **a-e**, holotype ♀ (3.7 mm), Tuamotu, Stn 336 (MNHN-Pg 5153) : **a**, shield and cephalic appendages; **b**, right antennal peduncle, lateral view; **c**, midportion of antennal flagellum; **d**, right cheliped, dorsal view; **e**, chela of same, ventral view. — **f-g**, paratype ♂ (3.4 mm), Austral Islands, Stn D 66 (MNHN-Pg 5154) : **f**, left cheliped, dorsal view; **g**, male second gonopods (left on left, right on right), anterior view. Scales equal 3 mm (a,d-f), 1 mm (b,c), and 1 mm (g).

Source : MNHN, Paris

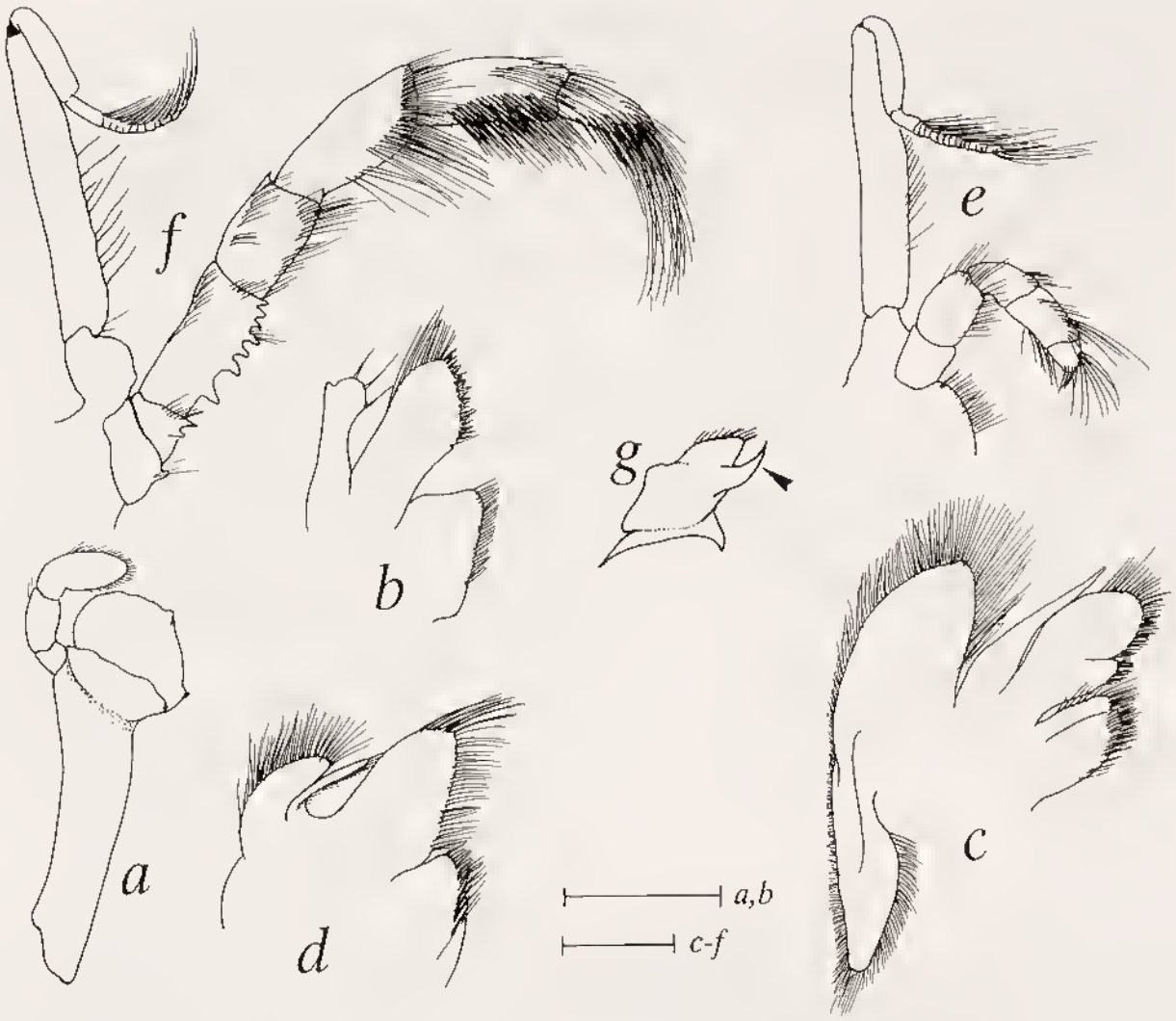

FIG. 25. — *Sympagurus tuamotu* sp. nov., paratype ♂ (3.4 mm), Austral Islands, Sin D 66 (MNHN-Pg 5154). Left mouthparts, internal view : **a**, mandible; **b**, maxillute; **c**, maxilla; **d**, first maxilliped; **e**, second maxilliped; **f**, third maxilliped; **g**, epistome, dorsolateral view, showing epistomial spine (arrow).
Scales equal 1 mm (a,b), and 0.5 mm (c-f).

Chelipeds markedly dissimilar. Right cheliped (Fig. 24d-e, 28i) massive, with dense, plumose setae on distal half of chela. Fingers curved ventromesially, terminating in small, usually blunt corneous claw; cutting edges with irregularly-sized calcareous teeth. Dactyl slightly longer than length of mesial margin of palm, and set at strongly oblique angle to longitudinal axis of palm; mesial margin broadly curved, well defined by row of blunt or sharp spines diminishing in size distally; dorsal face with scattered small tubercles, ventral face smooth, ventromesial face concave. Fixed finger broad at base, dorsal and ventral faces smooth. Palm broader than long, lateral margin well delimited by row of blunt to sharp spines; mesial face strongly concave, expanded distally, smooth or with scattered small tubercles; dorsomesial and ventromesial margins well delimited by row of blunt or sharp spines; dorsal surface smooth except for few small tubercles proximally; ventral surface smooth except for few small tubercles distolaterally. Carpus with lateral margin well delimited by row of spines; dorsal face with irregular rows of small spines; dorsodistal margin with row of spines; ventromesial distal margin mesially expanded, with row of spines; ventral face with scattered small tubercles. Merus with dorsal surface unarmed except for few bristle-like setae, distally; ventromesial margin with row of small spines. Ischium with ventromesial row of small spines. Coxa with row of small spines on ventrodistal margin, and ventromesial row of setae.

Source : MNHN, Paris

Left cheliped (Fig. 24f) well calcified. Fingers terminating in small corneous claw; dorsal and ventral surfaces unarmed except for scattered tufts of setae; cutting edge of dactyl with row of minute, fused corneous teeth; cutting edge of fixed finger with row of regularly spaced, small, evenly-sized teeth. Dactyl subequal to palm in length. Palm with small, setose tubercle on dorsomesial angle, and scattered setae on dorsomesial margin; ventral face smooth except for scattered setae. Carpus with strong dorsodistal spine; dorsal margin with long, dense setae, and small spine at about midlength; ventral face smooth. Merus with long setae on dorsal margin in addition to 2 to 4 bristles distally; ventrolateral distal margin with row of spines; ventral face smooth. Ischium with 1 or 2 small spines on ventromesial margin. Coxa unarmed, but with ventromesial row of setae.

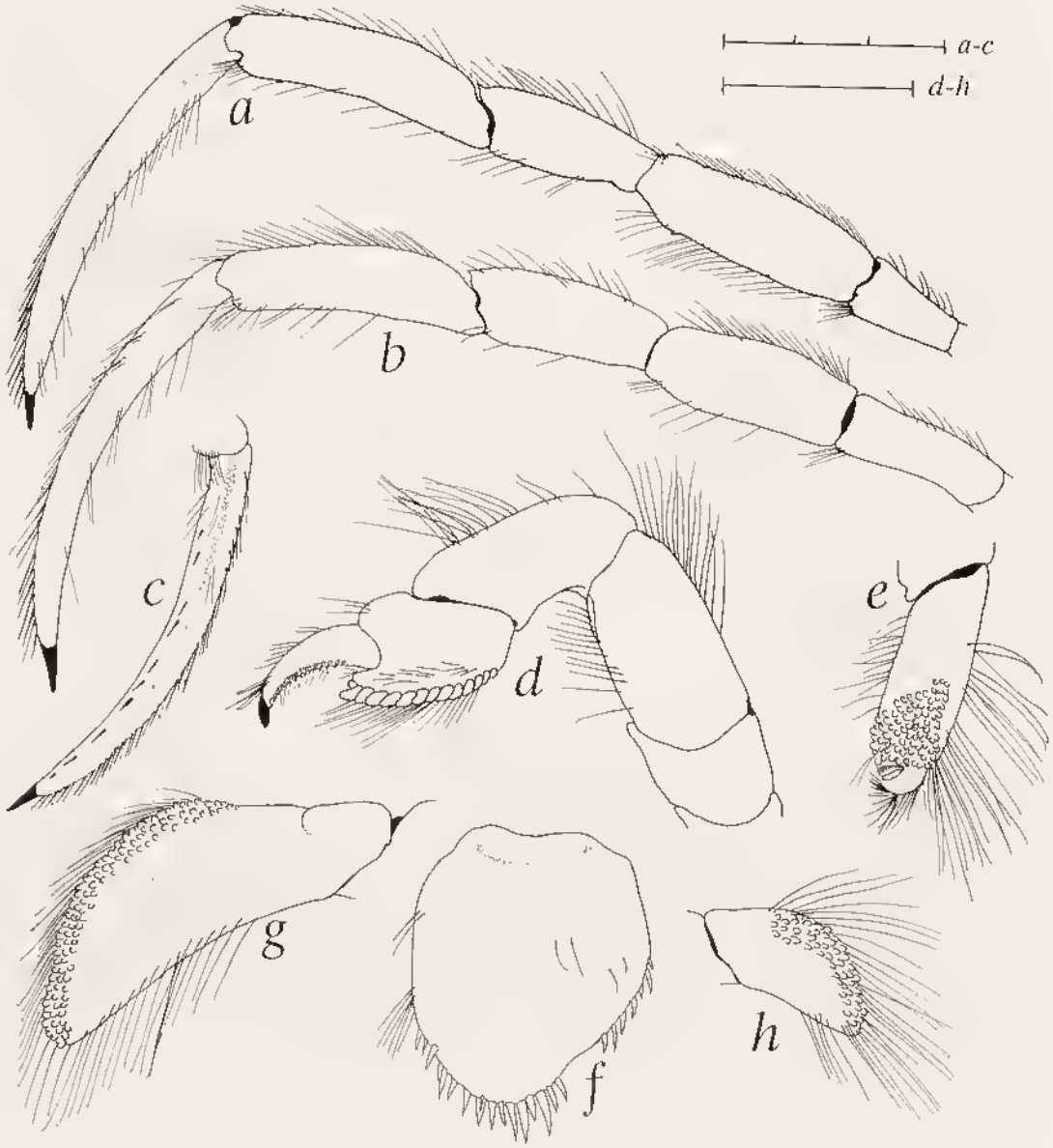

FIG. 26. — *Sympagurus tuamotu* sp. nov., holotype ♀ (3.7 mm), Tuamotu, Stn 336 (MNHN-Pg 5153) : a, second left pereopod, lateral view; b, third left pereopod, lateral view; c, dactyl of same, mesial view; d, fourth left pereopod, lateral view; e, propodus and dactyl of fifth left pereopod, lateral view; f, telson, dorsal view; g, exopod of left uropod, dorsal view; h, exopod of right uropod, dorsal view.
Scales equal 3 mm (a-c), and 1 mm (d-h).

Source : MNHN, Paris

Ambulatory legs (Fig. 26a-c) similar right from left, exceeding extended right cheliped by approximately 0.25 length of dactyl. Dactyl twice as long as propodus, terminating in sharp corneous claw; with dorsal and dorsomesial rows of bristle-like setae, and ventromesial row of about 10 corneous spines; lateral and mesial faces with shallow, longitudinal sulcus on proximal half (deeper on mesial face). Propodus with row of setae on dorsal margin. Carpus with small dorsodistal spine, and long setae dorsally. Merus of second pereopods with small spine on ventral margin distally, merus of third pereopod unarmed, both with setae on dorsal margin. Ischium and coxa unarmed. Anterior lobe of sternite of third pereopods sloping, setose, armed with simple or bifid spine.

Fourth pereopod (Fig. 26d) subchelate. Dactyl terminating in sharp corneous claw; with ventrolateral row of small corneous spinules. Propodus longer than wide, rasp formed of 1 row of rounded scales. Carpus with long setae on dorsal margin. Merus with rows of long setae on dorsal and ventral margins.

Fifth pereopod (Fig. 26e) chelate. Propodal rasp extending to mid-length of segment.

Eleven pairs of phyllobranch gills.

Uropods and telson (Fig. 26f-h) markedly asymmetrical. Telson lacking transverse suture; dorsal surface with scattered setae; posterior lobes separated by shallow cleft, terminal margin of lobes armed with long corneous spines.

Male lacking first gonopods: second pair of gonopods (Fig. 24g) weakly developed, asymmetrical, 2-segmented, right slightly larger and more setose than left. Female with vestigial second right pleopod.

HABITAT AND SYMBIOTIC ASSOCIATIONS. — One specimen found inhabiting a gastropod shell with two unidentified anthozoan polyps growing on the shell (Fig. 28i).

COLOR (Fig. 28i). — General appearance whitish or semitransparent with reddish areas and bands on chelipeds and walking legs. Carpus of right cheliped with reddish area on proximal half of mesial and lateral faces. Left cheliped with chela reddish proximally on dorsal, mesial, and lateral faces. Walking legs with reddish band proximally on carpi and propodi.

DISTRIBUTION. — Known so far only from French Polynesia. Depth : 400 to 760 m.

ETYMOLOGY. — This species is named after the archipelago where some of the specimens were found, in recognition of the polynesian people and the paradisiacal land where they live.

REMARKS. — Of the Parapaguridae so far known from French Polynesia, this is the only species in which males lack first gonopods. Other members of the family lacking first gonopods in the male include *S. acutus acutus* de Saint Laurent, 1972, *S. a. bicarinatus* de Saint Laurent, 1972, *S. a. hirsutus* de Saint Laurent, 1972, *S. haigae* de Saint Laurent, 1972, *S. hobbiti* (Macpherson, 1983), *S. orientalis* de Saint Laurent, 1972, and *S. rutilicheles* (A. Milne Edwards, 1891).

INTERSPECIFIC RELATIONSHIPS OF *SYMPAGURUS* SPECIES

In reinstating the genus *Sympagurus* Smith, 1883, LEMAITRE (1989) noted its heterogeneity, and suggested a number of characters that could be used to evaluate the species. Examination of representative material of all species of *Sympagurus* from throughout the world has shown that they can be arranged in at least three informal groups of species. Although the phylogenetic significance of such grouping is uncertain at this time, this arrangement serves at least as an aid in identifying the species.

Group 1 is defined by the presence of a slender epistomial spine that is strongly curved upward (e.g. Fig. 25g); it includes nine species (asterisks indicate species found in French Polynesia) :

Sympagurus africanus (de Saint Laurent, 1972); eastern Atlantic and southwestern Indian Ocean; 235 to 555 m.

Sympagurus bicristatus (A. Milne Edwards, 1880); western and eastern Atlantic; 270 to 1070 m.

Sympagurus gracilis (Henderson, 1888), western and eastern Atlantic; 146 to 634 m.

Source : MNHN, Paris

Sympagurus haigae (de Saint Laurent, 1972); eastern Pacific; 55 to 923 m.
Sympagurus indicus (Alcock, 1905); IndoPacific; 380 to 1000 m.
Sympagurus minutus (Henderson, 1896); IndoPacific; 800 to 2300 m.
Sympagurus monstrosus (Alcock, 1894); IndoPacific; 200 to 1000 m.
Sympagurus orientalis (de Saint Laurent, 1972); IndoPacific; 300 to 575 m.
**Sympagurus tuamotu* sp. nov.; Pacific (French Polynesia); 400 to 760 m.

Group 2 is defined by the presence of a vestigial pleurobranch on each side of the last thoracic somite (see LEMAITRE, 1989 : 10, fig. 2G), and includes ten species :

Sympagurus aciuops Lemaitre, 1989; western and eastern Atlantic; 1246 to 2537 m.
**Sympagurus affinis* (Henderson, 1888); IndoPacific; 360 to 914 m.
Sympagurus andersoni (Henderson, 1896), new combination; IndoPacific; 700 to 1300 m.
Sympagurus brevipes (de Saint Laurent, 1972); IndoPacific; 200 to 600 m.
Sympagurus dimorphus (Studer, 1883); southern hemisphere from 22°to 57°S; 110 to 1995 m.
**Sympagurus dofleini* (Balss, 1912); western and central Pacific, questionably the western Indian Ocean; 350 to 900 m.
Sympagurus pictus Smith, 1883; western Atlantic; 180 to 2322 m.
**Sympagurus planimanus* (de Saint Laurent, 1972); IndoPacific; 100 to 600 m.
**Sympagurus poupini* sp. nov.; Pacific (French Polynesia, Western Samoa, Wallis Island); 300 to 600 m.
**Sympagurus trispinosus* (Balss, 1911); IndoPacific; 580 to 1412 m.

Group 3, a heterogenous group, includes the remaining 14 species and three subspecies, which have not been found to share any particular character. Although some members of this group have an epistomial spine, it is always straight, not curved upwardly, and all lack vestigial pleurobranchs on the last thoracic somite. This group includes :

Sympagurus acutus acutus (de Saint Laurent, 1972); IndoPacific; 160 to 560 m.
Sympagurus acutus bicarinatus (de Saint Laurent, 1972); Pacific (Philippines); 1070 m.
Sympagurus acutus hirsutus (de Saint Laurent, 1972); IndoPacific; 240 to 400 m.
**Sympagurus boletifer* (de Saint Laurent, 1972); IndoPacific; 85 to 350 m.
**Sympagurus bougainvillei* sp. nov.; Pacific (French Polynesia); 190 to 280 m.
Sympagurus chuni (Balss, 1911); western Indian Ocean; 638 to 977 m.
Sympagurus curvispina (de Saint Laurent, 1974); Indian Ocean (Amsterdam Island); 50 to 60 m.
Sympagurus diogenes Whitelegge, 1900; IndoPacific; 60 to 180 m.
Sympagurus hobbsi (Macpherson, 1983); southeastern Atlantic; 250 m.
Sympagurus macrocerus (Forest, 1955); eastern Atlantic; 128 to 280 m.
Sympagurus pacificus Edmondson, 1925; Pacific (Hawaii); 366 m.
Sympagurus pilimanus (A. Milne Edwards, 1880); western Atlantic; 36 to 2034 m.
Sympagurus rugosus (de Saint Laurent, 1972); Pacific (Hawaii); 240 to 270 m.
Sympagurus rutricheles (A. Milne Edwards, 1891); Pacific (Hawaiian Islands), and eastern Atlantic; 200 to 1440 m.
Sympagurus spinimanus (Balss, 1911); western Indian Ocean; 277 m.
Sympagurus tuberculosus (de Saint Laurent, 1972); Pacific (Hawaii); 220 to 300 m.
**Sympagurus wallisi* sp. nov.; Pacific (French Polynesia); 240 to 280 m.

The polarity of the characters used to define these three groups is unclear. The presence of an epistomial spine (as defined by LEMAITRE, 1989 : 8, fig. 1A) in many parapagurids is a unique condition among all hermit crabs, except for one species of the family Pylochelidae, *Parapylocheles scorpio* (Alcock, 1894). In this pylochelid, the epistome is armed with three short, straight spines (see FOREST, 1987, fig. 4b). In parapagurids the epistome can be armed or unarmed, depending on the species. The epistome can have a curved spine such as in species of Group 1, or a straight spine such as in some species of Groups 2 and 3. In species of Group 1, the curved epistomial spine is invariably present in all specimens. In species of Groups 2 and 3, the occurrence of an epistomial spine can vary considerably within the same species, and in some species is always absent.

Source : MNHN, Paris

The presence of an armed epislome in a species (*P. scorpio*) of pylochelid, a group traditionally considered primitive (e.g. BOAS, 1926; RUSSELL, 1962), could be cited as evidence of the plesiomorphic nature of this condition. However, given FOREST's (1987) recent contention that pylochelids are probably not a primitive but an advanced group, such assumption is questionable.

Similarly, the presence in species of Group 2 of a vestigial pleurobranch on each side of the last thoracic somite, is a unique condition among all hermit crabs. Species of Groups 1 and 3 lack the vestigial pleurobranchs. Presumably, the evolutionary process leading to the loss of branchiae on the last thoracic somite in species of Group 2, is not complete. A full determination of the phylogenetic significance of this grouping will have to await a detailed character analysis of all members of the genus *Sympagurus* and family Parapaguridae.

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Source : MNHN, Paris

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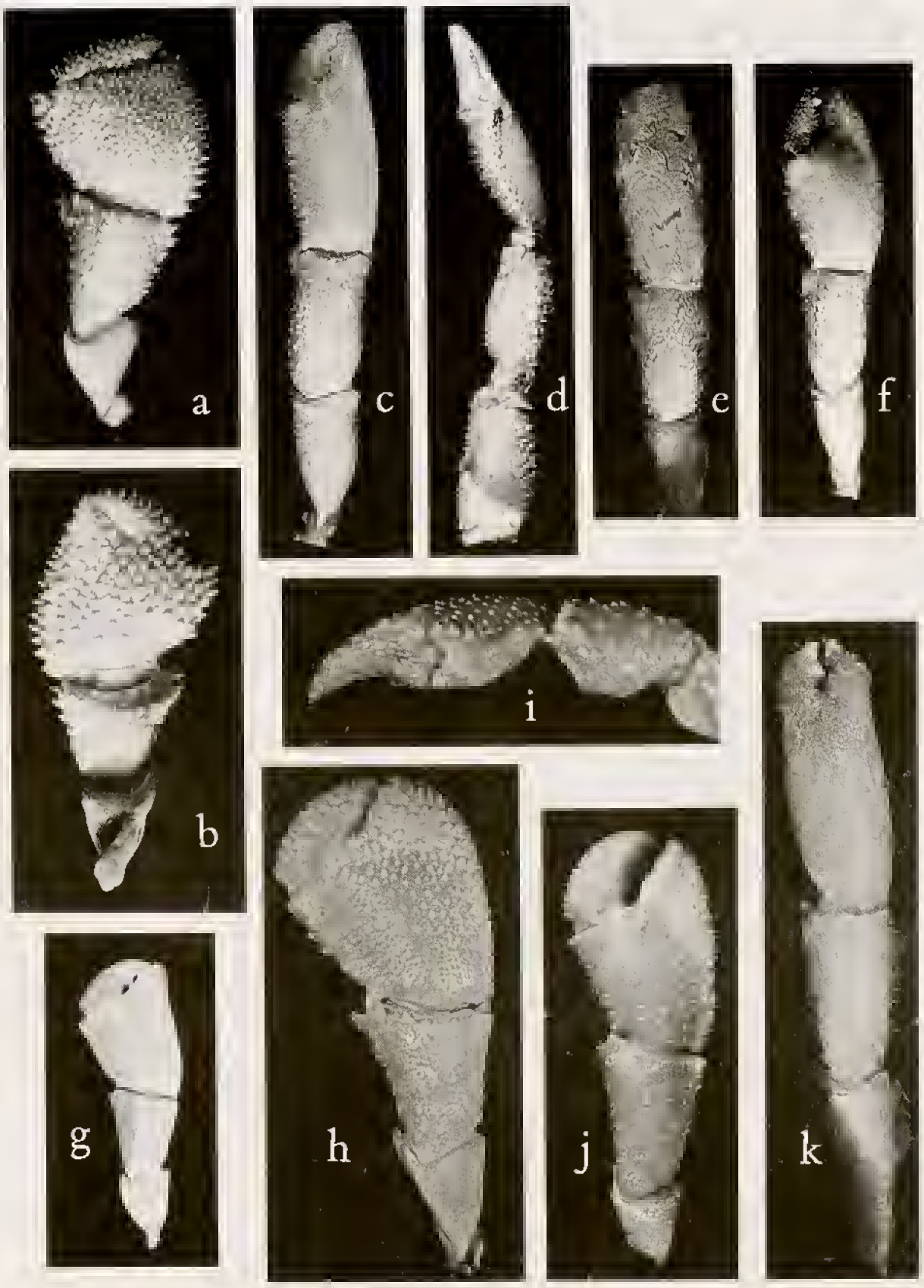
Source : MNHN, Paris

FIG. 27. — Right cheliped. **a-b** : *Sympagurus boletifer* (de Saint Laurent, 1972), ♂ (5.7 mm), Austral Islands, Stn 344 (MNHN-Pg 5137) : **a**, dorsal view; **b**, ventral view. — **c-f** : *Sympagurus dofleini* (Balss, 1912), Tuamotu, Stn 311 (MNHN-Pg 5139) : **c**, ♂ (21.6 mm), denuded, dorsal view ; **d**, same, mesial view; **e**, ♂ (21.8 mm), dorsal view; **f**, ♀ (19.5 mm), denuded, dorsal view. — **g** : *Sympagurus diogenes* Whitelegge, 1900, ♂ (12.2 mm), southeastern Australia (USNM 64604) : dorsal view. — **h-i** : *Sympagurus wallisi* sp. nov., ♂ (12.5 mm), Tuamotu, Stn 308 (MNHN-Pg 5145) : **h**, dorsal view; **i**, mesial view. — **j** : *Sympagurus bougainvillei* sp. nov., holotype ♂ (11.9 mm), Tuamotu, Stn 308 (MNHN-Pg 5148) : dorsal view. — **k** : *Sympagurus poupini* sp. nov., ♂ (20.0 mm), Tuamotu, Stn 309 (USNM 265395) : dorsal view.

a,b: x 4.7; c,d: x 1.2; e: x 1.1; f: x 1.3; g: x 1.3; h,i: x 3.1; j: x 3.2; k: x 2.

Source : MNHN, Paris

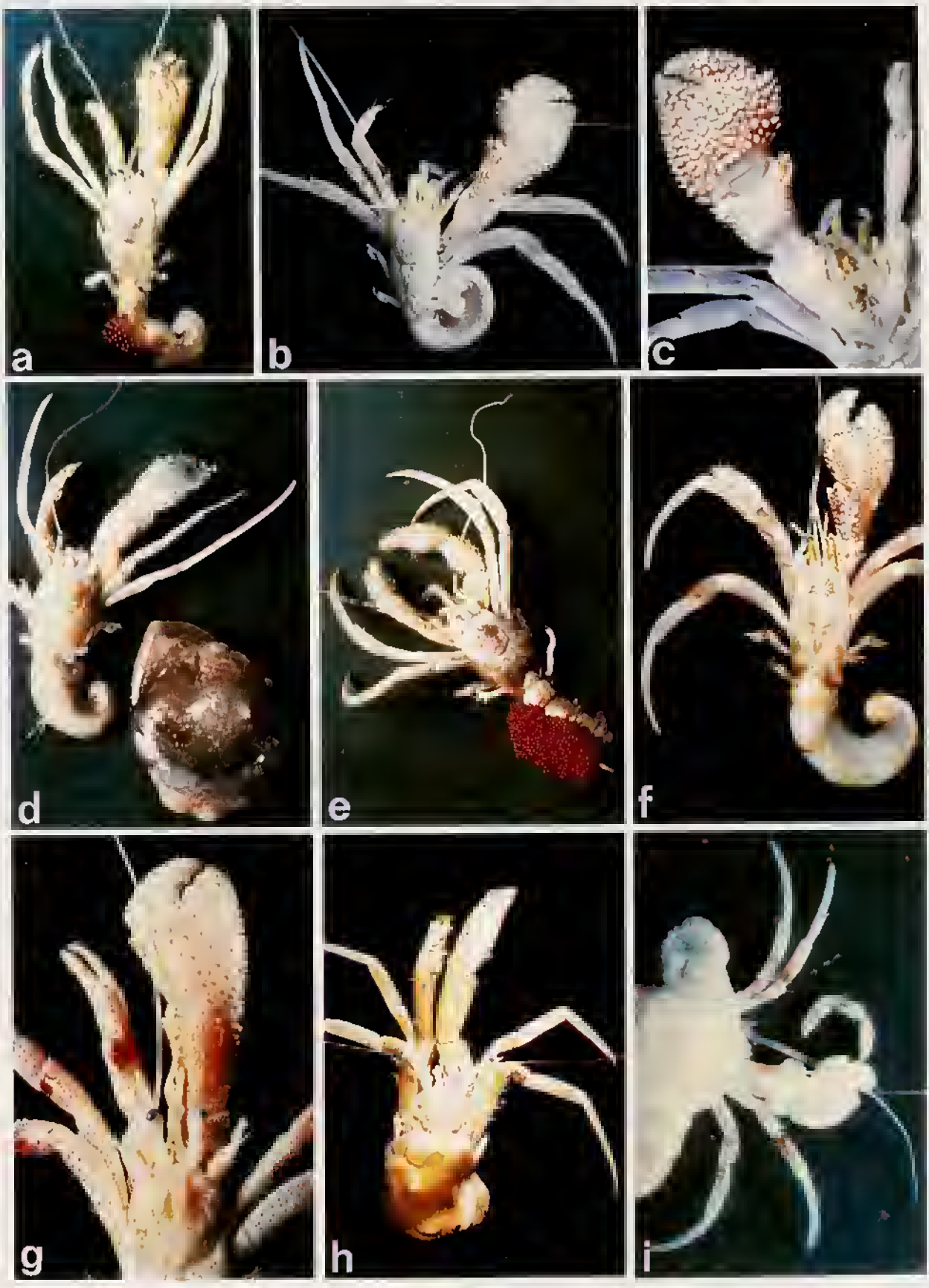


Source : MNHN, Paris

FIG. 28. — **a**, *Sympagurus affinis* (Henderson, 1888), Rurutu, Stn 339 (MNHN-Pg 5136). — **b-c**, *Sympagurus boletifer* (de Saint Laurent, 1972), Austral Islands, Stn 344 (MNHN-Pg 5137) : **b**, dorsal view; **c**, anterior portion, ventral view. — **d**, *Sympagurus dofleini* (Balss, 1912), specimen shown along side of zoanthid symbiont, Gambier Islands, Stn 311 (MNHN-Pg 5139). — **e**, *Sympagurus trispinosus* (Balss, 1911), Tuamotu, Stn. 309 (MNHN-Pg 5143). — **f**, *Sympagurus wallisi* sp. nov., dorsal view, Tuamotu, Stn 231 (USNM 265393). — **g**, *Sympagurus bougainvillei* sp. nov., anterior portion, dorsal view, Tuamotu, Stn 308 (USNM 265394). **h**, *Sympagurus poupini* sp. nov., specimen in actinian symbiont, Tuamotu, Stn 250. — **i**, *Sympagurus tuamotu* sp. nov., holotype specimen in shell with two anthozoan polyps, dorsal view, Tuamotu, Stn 336 (MNHN-Pg 5153).

[All photographs by J. POUPIN (SMCB)]

Source : MNHN, Paris



Source : MNHN, Paris

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12

Crustacea Decapoda : Studies on the genus *Munida* Leach, 1820 (Galatheidae) in New Caledonian and adjacent waters with descriptions of 56 new species

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ABSTRACT

A large collection of species of the genus *Munida* has been examined and found to contain 56 undescribed species. The specimens examined were caught mainly off New Caledonia, Chesterfield Islands, Loyalty Islands, Matthew and Hunter Islands. Several samples from Kiribati, the Philippines and Indonesia have also been included. The specimens were collected between 6 and 2 049 m. Some species previously known in the area (*M. gracilis, M. haswelli, M. microps, M. spinicordata* and *M. tuberculata*) have been illustrated. These results point up the high diversity of this genus in the region and the importance of several characters in species identification (e.g., size and number of lateral spines on the carapace, ornamentation of the thoracic sternites, size of antennular and antennal spines, colour pattern).

RÉSUMÉ

Crustacea Decapoda : Le genre *Munida* Leach, 1820 (Galatheidae) dans les eaux néo-calédoniennes et avoisinantes. Description de 56 espèces nouvelles.

Une collection comprenant 76 espèces du genre *Munida* dont 56 sont nouvelles, récoltée principalement autour de la Nouvelle-Calédonie, les îles Chesterfield, Loyauté, Matthew et Hunter, entre 6 et 2049 m de profondeur, est étudiée ici. Outre les espèces nouvelles, on a illustré quelques espèces déjà connues de la région : *M. gracilis, M. haswelli, M. microps, M. spinicordata* et *M. tuberculata*. Cette étude montre la grande diversité du genre *Munida* dans la région et l'importance de certains caractères morphologiques pour l'identification des espèces (par exemple, la taille et le nombre des épines latérales de la carapace, l'ornementation des sternites thoraciques, la taille des épines antennulaires et antennaires, la coloration).

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Source : MNHN, Paris

INTRODUCTION

Relatively few studies exist on galatheid crustaceans in the Southwestern Pacific, and of those that do exist, only a small number deal with the genus *Munida*, e.g., MIERS (1874, 1884), HENDERSON (1885, 1888), WHITELEGGE (1900), HALE (1927, 1941), HEALY & YALDWYN (1970), HAIG (1973, 1974), BABA (1974, 1986a). Fourteen species have been reported in the region, including : *M. gregaria* (Fabricius, 1793); *M. japonica* Simpson, 1858; *M. spinulifera* Miers, 1884; *M. gracilis* Henderson, 1885; *M. spinicordata* Henderson, 1885; *M. tuberculata* Henderson, 1885; *M. incerta* Henderson, 1888; *M. normani* Henderson, 1885; *M. haswelli* Henderson, 1885; *M. militaris* Henderson, 1885; *M. microps* Alcock, 1894; *M. elegantissima* de Man, 1902; *M. chathamensis* Baba, 1974; and *M. soelae* Baba, 1986.

Since the early 1980s a number of expeditions carried out off New Caledonia and in adjacent waters have produced a large number of specimens of the genus *Munida*, resulting in the discovery of numerous new species. This material, together with recent work by BABA (1988, 1990), MACPHERSON & DE SAINT LAURENT (1991), MACPHERSON (1991, 1993), TIRMIZI & JAVED (1992), and MACPHERSON & BABA (1993) in the Pacific and Indian oceans, is indicative of the high diversity of this genus.

The present paper examines specimens collected off New Caledonia, Chesterfield Islands, Loyalty Islands and Matthew and Hunter Islands (RICHER DE FORGES, 1990), including some samples from the Philippines, Indonesia, Kiribati and some from adjacent waters (e.g., Fiji, Australia, New Zealand) for which there have been few additional drawings or illustrations since the original descriptions. Material on species that have also been recorded in other areas (e.g., Philippines) has also been included in this paper. A key has been constructed, encompassing all the species present in the Southwestern Pacific, with the exception of *M. gregaria* and *M. chathamensis*, for which comparative material was unavailable (for *M. japonica* see MACPHERSON & BABA, 1993). However, these species are readily differentiable from the species considered herein. Three species collected in the area : *M. inornata* Henderson, 1885, *M. sacksi* Macpherson, 1993 and *M. maguiantemmulata* Baba & Türkay, 1992, have only been included in the key (see BABA & TÜRKAY, 1992; MACPHERSON, 1993; MACPHERSON & BABA, 1993).

A number of workers (e.g., CHACE, 1942; ZARIQUIEY ALVAREZ, 1952; RICE & DE SAINT LAURENT, 1985; BABA, 1988; MACPHERSON & DE SAINT LAURENT, 1991) have referred to the importance of certain characters in species identification (e.g., number of lateral spines on the carapace, ornamentation of the thoracic sternites, corneal diameter, size of antennular and antennal spines, colour pattern). This study also contemplates the spinulation on the second abdominal segment. This character may present certain variation, and specimens belonging to the same species may have no spines or up to 1-2 spines on each side of the anterior ridge. So, species bearing spines along the entire anterior ridge may also include individuals that have spines only on the sides. However, this character is extremely constant in the material collected off New Caledonia. Consequently, species were readily subdivided into two groups on the basis of this character : (1) those with spines all along the anterior ridge of the second segment or in the centre of the segment; (2) those without spines or bearing spines only along the sides of the anterior ridge. All closely related species can be differentiated by other characters as well as by the spinulation on the abdomen. Therefore, because of its ease of use, this character has been included in the key to the species. Given the variability referred to above, the key should be applied with caution to specimens from other areas.

The number of spines on the lateral margins of the carapace behind the cervical groove is constant and is very useful in separating species. However, in certain of the species considered (e.g., *M. barangei*) these spines were quite small, and it was difficult to tell whether four or five spines, the common numbers for the species in question, were present. In this paper species with tiny spinelets were assumed to have five spines.

As in previous papers (e.g., MACPHERSON & BABA, 1993) and in order to avoid needless repetition in the descriptions, the definition of each species includes only the distinctive characters, on the assumption that most of the other characters will be readily apparent from the illustrations. Furthermore, the colour patterns of the different species are based upon colour slides.

Source : MNHN, Paris

Lastly, as reported previously by MACPHERSON & DE SAINT LAURENT (1991), some species have one pair of male gonopods, while others have two pairs, which is suggestive of the existence of two separate genera. In the present paper both groups have been included in the genus *Munida*, together with two species with a deep orbit (*Munida urizae* and *M. yante*), that probably belong to another genus. In the light of the diversity of the genus *Munida* and of closely related genera (*Paramunida* and *Bathymunida*), an analysis of these genera is distinctly called for, with a view of establishing the relationships among them and the proper classification of some of certain forms that have recently been described.

The types of the new species and other specimens are deposited in the collections of the Muséum national d'Histoire naturelle de Paris (MNHN), except for duplicates which each time it was possible have been deposited in the collections of the National Museum of Natural History in Washington (USNM). The other abbreviations for the institutions whose collections were used in this study are : The Natural History Museum, London (BM) and the Zoological Laboratory, Kyushu University (ZLKU). The measurements given are the carapace length, excluding rostrum. The terminology used follows previous papers (see ZARIQUIEY ALVAREZ, 1952; MACPHERSON & DE SAINT LAURENT, 1991).

LIST OF SPECIES

M. abelloi sp. nov.
M. acantha sp. nov.
M. alonsoi sp. nov.
M. amblytes sp. nov.
M. andrewi sp. nov.
M. armilla sp. nov.
M. barangei sp. nov.
M. bellior Miyake & Baba, 1967
M. brachytes sp. nov.
M. callirrhoe sp. nov.
M. callista sp. nov.
M. clinata sp. nov.
M. cornuta sp. nov.
M. distiza sp. nov.
M. eclepsis sp. nov.
M. elachia sp. nov.
M. elegantissima de Man, 1902
M. eminens Baba, 1988
M. erato sp. nov.
M. gordoae sp. nov.
M. gracilis Henderson, 1885
M. guttata sp. nov.
M. haswelli Henderson, 1885
M. hyalina sp. nov.
M. idyia sp. nov.
M. incerta Henderson, 1885
M. inornata Henderson, 1885 (*)
M. javieri sp. nov.
M. laurentae sp. nov.
M. leagora sp. nov.
M. leptitis sp. nov.
M. leptosyne sp. nov.
M. leviantennata Baba, 1988
M. lineola sp. nov.
M. magniantennulata Baba & Türkay, 1992 (*)
M. marini sp. nov.
M. masi sp. nov.
M. microps Alcock, 1894
M. militaris Henderson, 1885
M. moliae sp. nov.
M. normani Henderson, 1885
M. notata sp. nov.
M. ocyrhoe sp. nov.
M. olivarae sp. nov.
M. pagesi sp. nov.
M. pontoporea sp. nov.
M. proto sp. nov.
M. psamathe sp. nov.
M. pseliophora sp. nov.
M. psylla sp. nov.
M. rhodonia sp. nov.
M. rogeri sp. nov.
M. rosula sp. nov.
M. rufiantennulata Baba, 1969
M. runcinata sp. nov.
M. sabatesae sp. nov.
M. sacksi Macpherson, 1993 (*)
M. sao sp. nov.
M. semoni Ortmann, 1894
M. soelae Baba, 1986
M. sphecia sp. nov.
M. spilota sp. nov.
M. spinicordata Henderson, 1885
M. squamosa Henderson, 1885

Source : MNHN, Paris

M. stia sp. nov.
M. stigmatica sp. nov.
M. taenia sp. nov.
M. thoe sp. nov.
M. tiresias sp. nov.
M. tuberculata Henderson, 1885
M. tyche sp. nov.
M. typhle sp. nov.
M. urizae sp. nov.
M. yante sp. nov.
M. zebra sp. nov.
Munida sp.

(*) only included in the key.

LIST OF STATIONS

The abbreviations of the gears used are : DC = Charcot dredge; DW = Waren dredge; DE = Epibenthic sledge; CP = Beam trawl; CC = Otter trawl (shrimps); D = Dredge.

R.V. *"Vauban"* (several cruises). **New Caledonia and Loyalty Islands.**

Station CB 34. — Loyalty Isl., Sandal Bay, 05.03.1977, 400 m : *M. callirrhoe, M. eminens, M. squamosa.*
Station CB 37. — 400 m : *M. callista.*
Station CB 79. — 400 m : *M. erato.*
Station without nº. — 22°49'S, 167°12'E, 390 m : *M. zebra.*
Station without nº. — 2°54'S, 167°12'E , 395-410 m : *M. zebra.*
Station without nº. — 13.04.1978, Ile des Pins, 400 m ; *M. sphecia.*
Station CB 105. — 13.04.1978, 22°48'S, 167°09'E, 360 m : *M. sphecia.*
Station D 3. — 23-28.05.1978, 22°17'S, 167°12'E, 390 m : *M. callirrhoe.*
Station D 4. — 23-28.05.1978, 22°17'S, 167°13'E, 400 m ; *M. callirrhoe, M. sphecia.*
Station without nº. — 06.06.1979, 22°33.2'S, 166° 25'E, 290-350 m : *M. squamosa.*
Station without nº. — 06.06.1979, 22°32.3'S, 166°25.8'E, 350-420 m : *M. leviantennata.*

LAGON. **New Caledonia.**

Station 190. — 19.09.1984, 22°02'S, 165°57'E, 135-150 m : *M. tyche.*
Station 342. — 28.11.1984, 22°51'S, 166°47'E, 55 m : *M. clinata.*
Station 364. — 29.11.1984, 22°41'S, 167°00'E, 49 m : *M. clinata.*
Station 370. — 30.11.1984, 22°38'S, 167°06'E, 127 m : *M. tyche.*
Station 378. — 21.01.1985, 22°40'S, 167°11'E, 70-72 m : *M. clinata.*
Station 387. — 22.01.1985, 22°39'S, 167°07'E, 318 m : *M. notata.*
Station 391. — 22.01.1985, 22°28'S, 167°13'E, 65 m : *M. clinata.*
Station 392. — 22.01.1985, 22°48.2'S, 167°02.3'E, 80 m : *M. clinata.*
Station 418. — 24.01.1985, 22°42'S, 167°11'E, 318 m : *M. notata.*
Station 433. — 25.02.1985, 18°06'S, 162°52'E, 40-67 m : *M. olivarae.*
Station 493. — 03.03.1985, 19°01.6'S, 163°08.8'E, 500-535 m : *M. squamosa.*
Station 495. — 03.03.1985, 19°04'S, 163°06'E, 80 m : *M. olivarae.*
Station 537. — 06.03.1985, 19°07'S, 163°22'E, 200 m : *M. sao.*
Station 538. — 06.03.1985, 19°07'S, 163°21'E, 195 m : *M. sao.*
Station 539. — 06.03.1985, 19°05'S, 163°17'E, 240 m : *M. sao.*
Station 583. — 18.07.1985, 22°45'S, 167°29'E, 44 m : *M. clinata, M. sao.*
Station 640. — 07.08.1986, 21°54.8'S, 166°45.8'E, 50-80 m : *M. elegantissima.*
Station 836. — 11.01.1987, 20°46.4'S 165°15.7'E, 57 m : *M. clinata.*
Station 837. — 11.01.1987, 20°45'S, 165°13.9'E, 28-36 m : *M. clinata.*
Station 904. — 26.04.1988, 21°00.8'S, 164°36'E, 250-300 m : *M. pagesi.*
Station 933. — 27.04.1988, 22°44.9'S, 164°14.9'E, 90-100 m : *M. clinata.*
Station 937. — 29.04.1988, 20°39'S, 164°15.4'E, 50-55 m : *M. clinata.*
Station 993. — 02.05.1988, 20°15'S, 163°52.8'E, 375-400 m : *M. pagesi.*
Station 1062. — 05.05.1988, 20°14.9'S, 163°53'E, 300-320 m : *M. leviantennata.*
Station 1140. — 27.10.1989, 19°24.3'S, 163°44.2'E, 44 m : *M. clinata.*
Station 1146. — 28.10.1989, 19°08.3'S, 163°30.9'E, 185 m : *M. sao, M. tyche.*

Source : MNHN, Paris

Station 1147. — 28.10.1989, 19°07'S, 163°30.4'E, 210 m : *M. sao.*
Station 1148. — 28.10.1989, 19°06.5'S, 163°30.1'E, 220 m : *M. sao.*
Station 1152. — 29.10.1989, 18°58'S, 163°23.9'E, 335 m ; *M. notata.*
Station 1153. — 29.02.1989, 18°58.4'S, 163°23.0'E, 330 m : *M. urizae.*

BIOCAL. **New Caledonia.**

Station DW 8. — 12.08.1985, 20°34.35'S, 166°53,90'E, 435 m : *M. armilla, M. rufiantennulata, M. thoe, M. tuberculata.*
Station CP 26. — 28.08.1985, 22°39.66'S, 166°27.41'E, 1618 m : *M. tiresias.*
Station CP 30. — 29.08.1985, 23°08.44'S, 166°40.83'E, 1140 m : *M. tiresias.*
Station CP 31. — 29.08.1985, 23°07.26'S, 166°50.45'E, 850 m : *M. eminens.*
Station CP 32. — 29.08.1985, 23°06.98'S, 166°51.20'E, 825 m : *M. eminens, M. rosula.*
Station DW 33. — 29.08.1985, 23°09.71'S, 167°10.27'E, 675 m : *M. rosula.*
Station DW 36. — 29.08.1985, 23°08.64'S, 167°10.99'E, 650 m : *M. alonsoi.*
Station DW 38. — 30.08.1985, 22°59,74'S, 167°15.31'E, 360 m : *M. acantha, M. sphecia, M. stia.*
Station CP 40. — 30.08.1985, 22°55.32'S, 167°23.30'E, 650 m ; *M. incerta.*
Station CP 42. — 30.08.1985, 22°45.14'S, 167°12.12'E, 380 m : *M. callirrhoe.*
Station DW 44. — 30.08.1985, 22°47.30'S, 167°14.30'E, 440 m : *M. stia.*
Station CP 45. — 30.08.1985, 22°47.34'S, 167°14.80'E, 430 m : *M. laurentae, M. sphecia, M. squamosa, M. zebra.*
Station DW 46. — 30.08.1985, 22°53.05'S, 167°17.08'E, 570 m : *M. alonsoi, M. amblytes, M. laurentae.*
Station CP 47. — 30.08.1985, 22°53.02'S, 167°16.77'E, 550 m : *M. laurentae.*
Station CP 52. — 31.08.1985, 23°05.79'S, 167°46.54'E, 600 m : *M. amblytes, M. incerta, M. laurentae.*
Station CP 54. — 01.09.1985, 23°10.30'S, 167°42.98'E, 1000 m : *M. amblytes.*
Station CP 61. — 02.09.1985, 24°11.67'S, 167°31.37'E, 1070 m : *M. microps.*
Station CP 62. — 02.09.1985, 24°19.06'S, 167°48.65'E, 1395 m : *M. typhle.*
Station DW 65. — 03.09.1985, 24°47.90'S, 168°09.09'E, 275 m : *M. rogeri.*
Station DW 66. — 03.09.1985, 24°55.43'S, 168°21.67'E, 515 m : *M. laurentae, M. rufiantennulata, M. stia, M. zebra.*
Station CP 67. — 03.09.1985, 24°55.44'S, 168°21.55'E, 500 m : *M. armilla, M. callista, M. elachia, M. laurentae, M. leagora, M. marini, M. ocythoe, M. psylla, M. thoe, M. zebra.*
Station CP 68. — 03.09.1985, 24°00.30'S, 168°07.03'E, 1430 m : *M. tiresias, M. typhle.*
Station CP 75. — 04.09.1985, 22°18.65'S, 167°23.30'E, 825-860 m : *M. eminens, M. rosula.*
Station DW 77. — 05.09.1985, 22°15.32'S, 167°15.40'E, 440 m : *M. leagora, M. squamosa.*
Station CP 78. — 05.09.1985, 22°16.28'S, 167°14.86'E, 445 m : *M. callirrhoe, M. callista, M. leagora, M. squamosa.*
Station DW 81. — 05.09.1985, 20°29.31'S, 166°46.56'E, 430 m : *M. laurentae.*
Station DW 82. — 06.09.1985, 20°30.65'S, 166°50.30'E, 440 m : *M. callista, M. leagora, M. leptitis, M. rufiantennulata.*
Station DW 83. — 06.09.1985, 20°35.07'S, 166°53.99'E, 460 m : *M. thoe.*
Station CP 84. — 06.09.1985, 20°43.49'S, 167°00.27'E, 150-210 m : *M. distiza, M. notata, M. tyche.*
Station CP 105. — 08.09.1985, 21°30.71'S, 166°21.72'E, 335 m : *M. callirhoe, M. moliae.*
Station CP 108. — 09.09.1985, 22°02.55'S, 167°05.68'E, 335 m : *M. callirrhoe, M. notata, M. pagesi, M. semoni.*
Station CP 109. — 09.09.1985, 22°10.03'S, 167°15.22'E, 495 m : *M. incerta, M. leviantennata, M. pagesi, M. squamosa.*
Station CP 110. — 09.09.1985, 22°12.38'S, 167°06.43'E, 275 m : *M. notata, M. sao.*

MUSORSTOM 4. **New Caledonia.**

Station CP 148. — 14.09.1985, 19°23.40'S, 163°31.90'E, 59 m : *M. acantha, M. notata, M. sphecia.*
Station DW 149. — 14.09.1985, 19°07.60'S, 163°22.7'E, 165 m : *M. sao.*
Station DW 150. — 14.09.1985, 19°07.5'S, 163°22.1'E, 110 m : *M. clinata.*
Station DW 151. — 14.09.1985, 19°07.0'S, 163°22.0'E, 200 m : *M. sao.*
Station CP 152. — 14.09.1985, 19°04.7'S, 163°21.6'E, 228 m : *M. sao, M. tyche.*
Station CP 153. — 14.09.1985, 19°04.2'S, 163°21.2'E, 235 m : *M. tyche.*

Source : MNHN, Paris

Station CP 155. — 15.09.1985, 18°52.8'S, 163°19.5'E, 500-570 m : *M. laurentae, M. moliae, M. sabatesae.*
Station DW 156. — 15.09.1985, 18°54'S, 163°18.8'E, 530 m : *M. incerta, M. moliae, M. thoe.*
Station CP 158. — 15.09.1985, 18°49.3'S, 163°15.0'E, 620 m : *M. armilla, M. incerta.*
Station DW 159. — 15.09.1985, 18°45.9'S, 163°15.6'E, 600 m : *M. incerta, M.* sp.
Station DW 162. — 16.09.1985, 18°35.0'S, 163°10.3'E, 535 m : *M. moliae, M. sabatesae.*
Station DW 163. — 16.09.1985, 18°33.8'S, 163°11.5'E, 350 m : *M. acantha.*
Station DW 164.— 16.09.1985, 18°33.20´S, 163°13'E, 250 m : *M. acantha.*
Station DW 167.— 16.09.1985, 18°35.8´S, 163°06.4'E, 575 m : *M. moliae, M. sabatesae.*
Station DC 168.— 16.09.1985, 18°48.20'S, 163°10.80'E, 720 m : *M. militaris.*
Station CP 169. — 17.09.1985, 18°54.03'S, 163°11.2'E, 600 m ; *M. incerta.*
Station CP 170. — 17.09.1985, 18°57.0'S, 163°12.6'E, 485 m : *M. callirhoe, M. idyia, M. incerta, M. moliae, M. squamosa.*
Station CP 172. — 17.09.1985, 19°01.20'S, 163°20'E, 275-330 m : *M. notata.*
Station CC 173. — 17.09.1985, 19°02.5'S, 163°18.8'E, 250-290 m : *M. masi.*
Station CP 178. — 18.09.1985, 18°56.3'S, 163°12.9'E, 520 m : *M. incerta, M. notata.*
Station CP 179. — 18.09.1985, 18°56.6'S, 163°13.7'E, 480 m : *M. incerta, M. squamosa.*
Station CP 180. — 18.09.1985, 18°56.8'S, 163°17.7'E, 450 m : *M. callirhoe, M. leagora, M. moliae, M. sabatesae, M. squamosa.*
Station DW 182. — 18.09.1985, 18°59.3'S, 163°24'E, 310 m : *M. stigmatica.*
Station DW 183. — 18.09.1985, 19°01.8'S, 163°25.8'E, 280 m ; *M. acantha, M. guttata, M. javieri, M. notata.*
Station DW 184. — 18.09.1985, 19°04'S, 163°27'E, 260 m : *M. guttata, M. notata, M. sao.*
Station DW 186. — 19.09.1985, 19°07.2'S, 163°29.7'E, 205 m : *M. sao, M. tyche.*
Station DW 187. — 19.09.1985, 19°08.3'S, 163°29.3'E, 65-120 m : *M. sao.*
Station CP 189. — 19.09.1985, 19°07.5'S, 163°29'E, 215 m : *M. sao.*
Station CP 190. — 19.09.1985, 19°06.3'S, 163°29.5'E, 215 m : *M. tyche.*
Station CP 191. — 19.09.1985, 19°02.4'S, 163°28.3'E, 255 m : *M. guttata.*
Station CP 192. — 19.09.1985, 18°59.3'S, 163°25'E, 320 m : *M. runcinata.*
Station CP 193. — 19.09.1985, 18°56.3'S, 163°23.2'E, 430 m : *M. acantha, M. sabatesae, M. sphecia, M. zebra.*
Station CP 194. — 19.09.1985, 18°52.8'S, 163°21.7'E, 550 m : *M. incerta, M. laurentae, M. moliae, M. ocyrhoe, M. sabatesae, M. thoe.*
Station CP 195. — 19.09.1985, 18°54.8'S, 163°22.2'E, 470 m : *M. callirrhoe, M. laurentae, M. moliae, M. runcinata, M. sabatesae, M. squamosa, M. thoe.*
Station DW 196. — 20.09.1985, 18°55.0'S, 163°23.7'E, 460 m : *M. acantha, M. moliae, M. sabatesae.*
Station DW 197. — 20.09.1985, 18°51.3'S, 163°21.0'E, 560 m : *M. incerta, M. zebra.*
Station CP 198. — 20.09.1985, 18°49.4'S, 163°18.8'E, 590 m : *M. andrewi, M. incerta, M. normani, M. ocyrhoe, M. rhodonia, M. rosula.*
Station CP 199. — 20.09.1985, 18°50.0'S, 163°14.5'E, 600 m : *M. incerta.*
Station CP 200. — 20.09.1985, 18°53.8'S, 163°14.1'E, 545 m : *M. incerta, M.* sp.
Station CC 201. — 20.09.1985, 18°55.8'S, 163°13,8'E, 500 m : *M. incerta, M. squamosa.*
Station CC 202. — 20.09.1985, 18°58.0'S, 163°10.5'E, 580 m : *M. incerta, M. rhodonia, M. squamosa, M.* sp.
Station DW 204. — 27.09.1985, 22°37.0'S, 167°05.7'E, 120 m : *M. clinata.*
Station DW 207. — 28.09.1985, 22°39.0'S, 167°07.4'E, 220-235 m : *M. spilota, M. tyche.*
Station DW 210. — 28.09.1985, 22°43.7'S, 167°09.3'E, 340-345 m : *M. notata.*
Station DW 212. — 28.09.1985, 22°47.4'S, 167°10,5'E, 375-380 m : *M. sphecia, M. taenia.*
Station CP 213. — 28.09.1985, 22°51.3'S, 167°12.0'E, 405-430 m : *M. sabatesae, M. sphecia, M. zebra.*
Station CP 214. — 28.09.1985, 22°53.8'S, 167°13.9'E, 425-440 m : *M. sphecia, M. zebra.*
Station CP 215. — 28.09.1985, 22°55.7'S, 167°17.0'E, 485-520 m : *M. laurentae, M. ocyrhoe, M. sphecia, M. zebra,*
Station CP 216. — 29.09.1985, 22°59.5'S, 167°22.0'E, 490-515 m : *M. alonsoi, M. ocyrhoe, M. thoe.*
Station DW 220. — 29.09.1985, 22°58.5'S, 167°38.3'E, 505-550 m : *M. alonsoi.*
Station DW 221. — 29.09.1985, 22°58.6'S, 167°36.8'E, 535-560 m : *M. incerta, M.* sp.
Station DW 222. — 30.09.1985, 22°57.6'S, 167°33.0'E, 410-440 m : *M. barangei, M. sphecia, M. zebra.*
Station DW 223. — 30.09.1985, 22°57.0'S, 167°30.0'E, 545-560 m : *M. incerta.*
Station DW 226. — 30.09.1985, 22°47.2'S, 167°21.6'E, 395 m : *M. notata, M. sphecia.*
Station DW 227. — 30.09.1985, 22°46.0'S, 167°20.0'E, 320 m : *M. guttata, M. notata, M. taenia.*

Source : MNHN, Paris

Station DW 228. — 30.09.1985, 22°47'S, 167°18.2'E, 420 m : *M. zebra.*
Station DW 229. — 30.09.1985, 22°51.6'S, 167°13.5'E, 445-460 m : *M. squamosa.*
Station DW 234. — 02.10.1985, 22°15.5'S, 167°08.3'E, 350-365 m : *M. notata, M. taenia.*
Station DC 235. — 02.10.1985, 22°13.0'S, 167°12.0'E, 405-415 m : *M. callirrhoe, M. notata.*
Station CP 236. — 02.10.1985, 22°11.3'S, 167°15,0'E, 495-550 m : *M. incerta, M. leviantennata, M. pagesi, M. rufiantennulata, M. squamosa.*
Station CP 238. — 02.10.1985, 22°13.0'S, 167°t4.0'E, 500-510 m : *M. incerta, M. leagora, M. ocyrhoe, M. rhodonia, M. rufiantennulata, M.* sp.
Station CP 239. — 02.10.1985, 22°14.8'S, 167°15.7'E, 470-475 m : *M. incerta, M. leagora, M. leviantennata, M. pagesi, M. squamosa, M.* sp.
Station CP 240. — 02.10.1985, 22°16.5'S, 167°16.5'E, 475-500 m : *M. barangei, M. incerta, M. ocyrhoe, M. rhodonia.*
Station CP 241. — 03.10.1985, 22°09.0'S, 167°12.2'E, 470-480 m : *M. incerta, M. leviantennata, M. pagesi, M.* sp.
Station CP 242. — 03.10.1985, 22°05.8'S, 167°10.3'E, 500-550 m : *M. incerta, M. pagesi, M. psamathe, M.* sp.
Station CP 243. — 03.10.1985, 22°02.8'S, 167°07.7'E, 435-450 m : *M. leviantennata, M. squamosa.*
Station CC 245. — 03.10.1985, 22°07.0'S, 167°t1.0'E, 415-435 m : *M. marini.*
Station CC 246. — 03.10.1985, 22°08.5'S, 167°11.5'E, 410-420 m : *M. callirrhoe, M. leviantennata, M. pagesi.*
Station CC 247. — 04.10.1985, 22°09.0'S, t67°13.3'E, 435-460 m : *M. callirrhoe, M. incerta, M. leviantennata, M. pagesi, M. squamosa.*
Station CC 248. — 04.10.1985, 22°09.5'S, 167°10.0'E, 380-385 m : *M. callirrhoe, M. runcinata.*

SMIB 1, **New Caledonia.**

Station DW 2. — 05.02.1986, 22°51.9'S, 167°13'E, 415 m : *M. sphecia.*
Station DW 7. — 06.02.1986, 22°55.5'S, 167°15.9'E, 500 m : *M. laurentae, M. zebra.*
Station DW 9. — 06.02.1986, 22°55'S, 167°14.7'E, 450 m : *M. sphecia, M. zebra.*
Station DW 10. — 07.02.1986, 22°55'S, 167°12'E, 395-410 m : *M. sphecia.*

SMIB 2. **New Caledonia.**

Station DW 1. — 17.09.1986, 22°52.7'S, 167°12.6'E, 444 m : *M. zebra.*
Station DW 2. — 17.09.1986, 22°54.9'S, 167°14.2'E, 448 m : *M. zebra.*
Station DW 3. — 17.09.1986, 22°56.0'S, 167°14.8'E, 428 m : *M. sphecia, M. zebra.*
Station DW 5. — 17.09.1986, 22°56.3'S, 167°14.4'E, 410 m : *M. sphecia, M. zebra.*
Station DW 6. — 17.09.1986, 22°56.2'S, 167°15.9'E, 460 m : *M. acantha, M. sphecia, M. zebra.*
Station DW 9. — 18.09.1986, 22°53.9'S, 167°15.4'E, 500 m : *M. sphecia.*
Station DW 10. — 18.09.1986, 22°55.2'S, 167°16.3'E, 495 m : *M. barangei, M. ocyrhoe.*
Station DW 11. — 18.09.1986, 22° 52.1'S, 167°15.4'E, 500 m : *M. incerta.*
Station DW 12. — 18.09.1986, 22°52.6'S, 167°14.0'E, 460 m : *M. barangei.*
Station DW 18 b. — 19.09.1986, 22°58.0'S, 167°20.4'E, 535 m : *M. alonsoi.*
Station DC 26. — 21.09.1986, 22°59.3'S, 167°23.0'E, 535 m : *M. ocyrhoe, M. thoe.*

CHALCAL 2. **New Caledonia.**

Station CC 1. — 28.t0.1986, 24°54.96'S, 168°21.91'E, 500-580 m : *M. armilla, M. laurentae, M. marini, M. ocyrhoe, M. thoe, M. zebra, M.* sp.
Station CC 2. — 28.10.1986, 24°55.48'S, 168°21.29'E, 500-610 m : *M. armilla, M. laurentae, M. marini, M. ocyrhoe, M. sabatesae, M. thoe, M. zebra.*
Station CH 4. — 27.10.1986, 24°44.31'S, 168°09.94'E, 253 m : *M. urizae.*
Station CP 18. — 27.10.1986, 24°47.00'S, 168°09.43'E, 274 m : *M. rogeri, M. urizae.*
Station CP 19. — 27.10.1986, 24°42.85'S, 168°09.73'E, 271 m : *M. distiza, M. guttata, M. stigmatica, M. urizae.*
Station CP 20. — 27.t0.1986, 24°44.60'S, 168°09.30'E, 230-300 m : *M. distiza, M. urizae.*
Station CP 21. — 28.10.1986, 24°54.00'S, 168°21.61'E, 500 m : *M. armilla, M. gordoae, M. laurentae, M. leagora, M. marini, M. thoe, M. zebra.*
Station CP 25. — 30.10.1986, 23°38.60'S, 167°43.12'E, 418 m : *M. barangei, M. zebra.*
Station CP 26. — 31.10.1986, 23°18.15'S, 168°03.58'E, 296 m : *M. taenia, M. urizae.*

Source : MNHN, Paris

Station CP 27. — 31.10.1986, 23°15.29'S, 168°04.55'E, 289 m : *M. taenia, M. urizae.*
Station DW 72. — 28.10.1986, 24°54.50'S, 168°22.30'E, 527 m : *M. armilla, M. laurentae.*
Station DW 73. — 29.10.1986, 24°39.90'S, 168°18.10'E, 573 m : *M. alonsoi, M. armilla, M. elachia, M. laurentae, M. psamathe, M. psylla, M. thoe, M.* sp.
Station DW 74. — 29.10.1986, 24°40.36'S, 168°38.38'E, 650 m : *M. alonsoi, M. amblytes, M. armilla, M. elachia, M. ocyrhoe, M. psamathe, M. soelae, M. tuberculata, M.* sp.
Station DW 75. — 29.10.1986, 24°39.31'S, 168°39.67'E, 600 m : *M. alonsoi, M. amblytes, M. armilla, M. laurentae, M. marini, M. psamathe, M. soelae, M. thoe, M. tuberculata, M.* sp.
Station DW 76. — 30.10.1986, 23°40.50'S, 167°45.20'E, 470 m : *M. alonsoi.*
Station DW 78. — 30.10.1986, 23°41.30'S, 167°59.60'E, 233-360 m : *M. guttata, M. stigmatica, M. taenia.*
Station DW 79. — 30.10.1986, 23°40.50'S, 168°00.6'E, 260 m : *M. guttata.*
Station DW 80. — 31.10.1986, 23°26.70'S, 168°01.80'E, 80-160 m : *M. clinata.*
Station DW 81. — 31.10.1986, 23°19.60'S, 168°03.40'E, 311 m : *M. acantha, M. taenia.*
Station DW 82. — 31.10.1986, 23°13.68'S, 168°04.27'E, 304 m : *M. laurentae, M. sphecia.*
Station DW 83. — 31.10.1986, 23°20.30'S, 168°05.50'E, 200 m : *M. guttata, M. notata, M. taenia.*
Station DW 84. — 31.10.1986, 23°23.80'S, 168°07.10'E, 170 m : *M. gordoae, M. guttata.*

BIOGEOCAL. **New Caledonia.**

Station CP 214. — 09.04.1987, 22°43.09'S, 166°27.19'E, 1665-1590 m : *M. tiresias.*
Station CP 232. — 12.04.1987, 21°33.81'S, 166°27.07'E, 760-790 m : *M. eminens, M. microps, M. rosula.*
Station CP 253. — 16.04.1987, 21°31.75'S, 166°28.73'E, 310-315 m : *M. hyalina.*
Station DW 291. — 27.04.1987, 20°34.47'S, 166°54.33'E, 510-520 m : *M. thoe.*
Station DW 292. — 27.04.1987, 20°28.23'S, 166°48.45'E, 465-470 m : *M. rosula.*
Station CP 297. — 28.04.1987, 20°38.64'S, 167°10.77'E, 1230-1240 m : *M. microps.*
Station DW 307. — 01.05.1987, 20°35.38'S, 166°55.25'E, 470-480 m : *M. armilla.*
Station DW 308. — 01.05.1987, 20°40.07'S, 166°58.05'E, 510-590 m : *M. callista, M.* sp.

SMIB 3. **New Caledonia.**

Station DW 1 — 20.05.1987, 24°55.70'S, 168°21.80'E, 520 m : *M. armilla, M. eclepsis, M. laurentae, M. leagora, M. thoe, M. zebra.*
Station DW 2. — 20.05.1987, 24°53.40'S, 168°21.70'E, 530 m : *M. armilla, M. laurentae, M. psamathe, M. soelae, M. thoe.*
Station DW 3. — 20.05.1987, 24°55.00'S, 168°21.70'E, 513 m : *M. armilla, M. laurentae, M. moliae, M. thoe, M. zebra.*
Station CP 4. — 20.05.1987, 24°54'S, 168°21.5'E, 530 m : *M. armilla, M. thoe, M. zebra.*
Station DW 5. — 21.05.1987, 24°54.9'S, 168°21.6'E, 502 m : *M. thoe, M. zebra.*
Station DW 6. — 21.05.1987, 24°56.40'S, 168°21.20'E, 505 m : *M. zebra.*
Station DW 7. — 21.05.1987, 24°54.60'S, 168°21.30'E, 505 m : *M. armilla, M. laurentae.*
Station DW 8. — 21.05.1987, 24°45.20'S, 168°08.00'E, 233 m : *M. armilla.*
Station DW 12. — 22.05.1987, 23°37.70'S, 167°41.50'E, 470 m : *M. alonsoi, M. barangei, M. laurentae, M. ocyrhoe.*
Station DW 13. — 22.05.1987, 23°37.50'S, 167°41.60'E, 448 m : *M. alonsoi.*
Station DW 14. — 22.05.1987, 23°40.10'S, 167°59.70'E, 246 m : *M. guttata.*
Station DW 18. — 23.05.1987, 23°41.50'S, 167°59.40'E, 338 m : *M. stigmatica.*
Station DW 21. — 24.05.1987, 22°59.20'S, 167°19.00'E, 525 m : *M. amblytes, M. incerta, M. rufiantennulata.*
Station DW 22. — 24.05.1987, 23°03.00'S, 167°19.10'E, 503 m : *M. laurentae.*
Station DW 23. — 24.05.1987, 22°58.00'S, 167°20.00'E, 530 m : *M. amblytes.*

SMIB 4. **New Caledonia.**

Station DW 34. — 07.03.1989, 24°55.0'S, 168°22.0'E, 515 m : *M. armilla, M. eclepsis, M. laurentae, M. leagora, M. marini, M. ocyrhoe, M. thoe, M. zebra, M.* sp.
Station DW 36. — 07.03.1989, 24°55.6'S, 168°21.7'E, 530 m : *M. armilla, M. laurentae, M. rufiantennulata, M. sphecia, M. zebra.*
Station DW 37. — 07.03.1989, 24°54.5'S, 168°22.3'E, 540 m : *M. armilla, M. laurentae, M. thoe, M. zebra.*

Source : MNHN, Paris

Station DW 38. — 07.03.1989, 24°54.5'S, 168°22.0'E, 510 m : *M. leagora, M. marini, M. ocyrhoe, M. thoe, M. zebra.*
Station DW 39. — 07.03.1989, 24°56.2'S, 168°21.5'E, 560 m : *M. armilla, M. laurentae, M. ocyrhoe, M. thoe.*
Station DW 41. — 07.03.1989, 24°44.0'S, 168°08.6'E, 235 m : *M. guttata.*
Station DW 42. — 08.03.1989, 24°45.7'S, 168°08.4'E, 320 m : *M. javieri, M. spilota.*
Station DW 44. — 08.03.1989, 24°46.0'S, 168°08.2'E, 300 m : *M. distiza, M. javieri, M. urizae.*
Station DW 51. — 09.03.1989, 23°41.3'S, 168°00.6'E, 260 m : *M. guttata.*
Station DW 55. — 09.03.1989, 23°21.4'S, 168°04.5'E, 260 m : *M. armilla, M. laurentae, M. taenia, M. thoe, M. zebra.*
Station DW 56. — 09.03.1989, 23°20.6'S, 168°05.2'E, 260 m : *M. taenia.*
Station DW 57. — 09.03.1989, 23°21.5'S, 168°04.6'E, 260 m : *M. guttata.*
Station DW 58. — 10.03.1989, 22°59.8'S, 167°24.2'E, 560 m : *M. laurentae.*
Station DW 62. — 10.03.1989, 23°00.4'S, 167°21.8'E, 540 m ; *M. ocyrhoe.*
Station DW 65. — 10.03.1989, 22°55.3'S, 167°14.5'E, 420 m : *M. zebra.*
Station DW 66. — 10.03.1989, 22°56.3'S, 167°14.6'E, 430 m ; *M. sphecia.*
Station DW 68. — 10.03.1989, 22°55.0'S, 167°16.0'E, 440 m : *M. sphecia.*
Station DW 69. — 10.03.1989, 22°55.8'S, 167°14.3'E, 405 m : *M. laurentae.*

SMIB 5. **New Caledonia.**

Station DW 70. — 07.09.1989, 23°40.6'S, 168°01.1'E, 260-270 m : *M. taenia.*
Station DW 76. — 07.09.1989, 23°41.2'S, 168°00.5'E, 240-280 m : *M. guttata.*
Station DW 78. — 07.09.1989, 23°40.8'S, 168°00.2'E, 235-248 m : *M. guttata.*
Station DW 80.— 07.09.1989, 23°41.9'S, 168°00.4'E, 270-300 m : *M. guttata.*
Station DW 81. — 09.09.1989, 22°38.2'S, 167°34.8'E, 110 m : *M. clinata.*
Station DW 82. — 09.09.1989, 22°31.7'S, 167°32.4'E, 155 m : *M. clinata.*
Station DW 84. — 13.09.1989, 22°20.8'S, 168°43.1'E, 290 m : *M. stigmatica.*
Station DW 86. — 13.09.1989, 22°19.8'S, 168°42.8'E, 320 m : *M. brachytes, M. sphecia, M. stigmatica.*
Station DW 87. — 13.09.1989, 22°18.17'S, 168°41.3'E, 335-370 m : *M. acantha, M. stigmatica.*
Station DW 88. — 13.09.1989, 22°18.6'S, 168°40.2'E, 350 m : *M. sphecia.*
Station DW 90. — 13.09.1989, 22°19.1'S, 168°41.6'E, 340 m : *M. urizae.*
Station DW 91. — 13.09.1989, 22°18.4'S, 168°41.1'E, 335-340 m : *M. moliae, M. notata.*
Station DW 94. — 13.09.1989, 22°19.6'S, 168°42.8'E, 260-275 m : *M. guttata, M. notata.*
Station DW 96. — 14.09.1989, 23°00.0'S, 168°18.7'E, 245 m : *M. clinata.*
Station DW 97. — 14.09.1989, 23°01.1'S, 168°18.0'E, 300 m : *M. acantha, M. sphecia, M. stigmatica.*
Station DW 98. — 14.09.1989, 23°01.7'S, 168°16.1'E, 320-335 m : *M. zebra.*
Station DW 99. — 14.09.1989, 23°24.7'S, 168°05.4'E, 58 m : *M. clinata.*
Station DW 100. — 14.09.1989, 23°22.9'S, 168°05.2'E, 120 m : *M. clinata.*
Station DW 101. — 14.09.1989, 23°21.2'S, 168°04.9'E, 225-270 m ; *M. taenia.*
Station DW 102. — 14.09.1989, 23°19.6'S, 168°04.7'E, 290-305 m : *M. taenia.*
Station DW 103. — 14.09.1989, 23°17.4'S, 168°04.8'E, 300-315 m : *M. taenia.*
Station DW 104. — 14.09.1989, 23°14.3'S, 168°04.5'E, 305-335 m : *M. acantha, M. sphecia, M. taenia.*

AZTÈQUE. **New Caledonia.**

Station CH 3. — 13.02.1990, 23°39.2'S, 168°01.3'E, 290-400 m : *M. laurentae.*
Station CH 6. — 14.02.1990, 23°40.4'S, 167°45.4'E, 425-470 m ; *M. laurentae.*
Station CH 11. — 15.02.1990, 22°52.3'S, 167°32.1'E, 340-360 m : *M. sphecia.*

SMIB 6. **New Caledonia.**

Station DW 106. — 02.03.1990, 19°08.1'S, 163°30.7'E, 165-195 m : *M. sao, M. tyche.*
Station DW 107. — 02.03.1990, 19°07.6'S, 163°30.2'E, 195-205 m : *M. sao.*
Station DW 108. — 02.03.1990, 19°06.9'S, 163°30.1'E, 210-220 m : *M. sao.*
Station DW 110. — 02.03.1990, 19°04.9'S, 163°29.8'E, 225-230 m : *M. sao.*
Station DW 112. — 02.03.1990, 19°05.6'S, 163°30.2'E, 220-225 m : *M. sao.*
Station DW 116. — 02.03.1990, 18°59.3'S, 163°26.2'E, 290-300 m : *M. notata.*

Source : MNHN, Paris

Station DW 118. — 03.03.1990, 18°58.5'E, 163°26.3'E, 290-300 m : *M. acantha*.
Station DW 120. — 03.09.1990, 18°58.5'S, 163°25.6'E, 310-325 m : *M. notata*.
Station DW 124. — 03.03.1990, 18°56.2'S, 163°24.5'E, 360-405 m : *M. notata, M. sabatesae*.
Station DW 125. — 03.03.1990, 18°57.4'S, 163°23.5'E, 335-350 m : *M. notata*.
Station DW 126. — 03.03.1990, 18°59.1'S, 163°22.7'E, 320-330 m : *M. notata*.
Station DW 127. — 04.09.1990, 19°08.8'S, 163°22.6'E, 190-205 m : *M. sao*.
Station DW 128. — 04.09.1990, 19°06.2'S, 163°22.4'E, 205-215 m : *M. sao*.
Station DW 130. — 04.09.1990, 19°04.9'S, 163°21'E, 190-295 m : *M. tyche*.

MUSORSTOM 6. **Loyalty Islands**.

Station DW 391. — 13.02.1989, 20°47.35'S, 167°05.70'E, 390 m : *M. leagora, M. notata, M. infiaintermulata, M. runcinata*.
Station DW 393. — 13.02.1989, 20°48.29'S, 167°09.54'E, 420 m : *M. laurentae*.
Station DW 398. — 13.02.1989, 20°47.19'S, 167°05.65'E, 370 m : *M. notata*.
Station DW 399. — 14.02.1989, 20°41.80'S, 167°00.20'E, 282 m : *M. guttata, M. notata*.
Station CP 401. — 14.02.1989, 20°42.15'S, 167°00.35'E, 270 m : *M. gordoae*.
Station DW 406. — 15.02.1989, 20°40.65'S, 167°06.80'E, 373 m : *M. notata, M. sphecia, M. zebra*.
Station DW 407. — 15.02.1989, 20°40.70'S, 167°06.60'E, 360 m : *M. zebra*.
Station CP 408. — 15.02.1989, 20°41.10'S, 167°07.45'E, 380 m : *M. callirrhoe, M. leagora*.
Station DW 411. — 15.02.1989, 20°40.65'S, 167°03,35'E, 424 m : *M. callirrhoe*.
Station DW 412. — 15.02.1989, 20°40.60'S, 167°03.75'E, 437 m : *M. callirrhoe*.
Station DW 413. — 15.02.1989, 20°40.10'S, 167°03.50'E, 463 m : *M. marini*.
Station CP 415. — 15.02.1989, 20°40.20'S, 167°03.95'E, 461 m : *M. callirrhoe, M. squamosa*.
Station DW 418. — 16.02.1989, 20°41.75'S, 167°03.35'E, 283 m : *M. gordoae*.
Station CP 419. — 16.02.1989, 20°41.65'S, 167°03,70'E, 283 m : *M. bellior, M. distiza, M. notata, M. pseliophora*.
Station CP 427. — 17.02.1989, 20°23.35'S, 166°20.00'E, 800 m : *M. eminens*.
Station DW 428. — 17.02.1989, 20°23.54'S, 166°12.57'E, 420 m : *M. leagora*.
Station DW 430. — 17.02.1989, 20°21.17'S, 166°07.25'E, 30 m : *M. olivarae*.
Station DW 431. — 18.02.1989, 20°22.25'S, 166°10.00'E, 21 m : *M. leptitis*.
Station DW 436. — 18.02.1989, 20°20.27'S, 166°07.49'E, 33 m : *M. olivarae*.
Station CP 437. — 18.02.1989, 20°20.14'S, 166°08.12'E, 31 m : *M. olivarae*.
Station CP 438. — 18.02.1989, 20°23.00'S, 166°20.10'E, 780 m : *M. eminens, M. rosula*.
Station DW 441. — 19.02.1989, 20°53.76'S, 167°16.86'E, 80 m : *M. leptosyne*.
Station CP 455. — 20.02.1989, 21°00.65'S, 167°26.08'E, 260 m : *M. rogeri*.
Station DW 457. — 20.02.1989, 21°00.42'S, 167°28.71'E, 353 m : *M. notata*.
Station DW 460. — 21.02.1989, 21°01.72'S, 167°31.45'E, 420 m : *M. callirrhoe, M. leagora, M. sphecia*.
Station CP 464. — 21.02.1989, 21°02.30'S, 167°31.60'E, 430 m : *M. callirrhoe, M. sphecia, M. runcinata, M. zebra*.
Station CP 465. — 21.02.1989, 21°03.55'S, 167°32.25'E, 480 m : *M. callirrhoe, M. squamosa*.
Station CP 466. — 21.02.1989, 21°05.25'S, 167°32.20'E, 540 m : *M. incerta, M. laurentae, M. rhodonia*, M. sp.
Station CP 467. — 21.02.1989, 21°05.13'S, 167°32.11'E, 575 m : *M. callirrhoe, M. laurentae, M. squamosa*.
Station DW 469. — 21.02.1989, 21°03.64'S, 167°34.67'E, 630 m : *M. incerta*.
Station CC 470. — 21.02.1989, 21°04.40'S, 167°33.20'E, 560 m : *M. incerta, M. laurentae, M. rhodonia*.
Station DW 472. — 22.02.1989, 21°08.60'S, 167°54.70'E, 300 m : *M. acantha, M. sphecia*.
Station DW 473. — 22.02.1989, 21°08 80'S, 167°55.30'E, 236 m : *M. gordoae, M. guttata*.
Station DW 474. — 22.02.1989, 21°08.80'S, 167°55.50'E, 260 m : *M. rogeri*.
Station DW 477. — 22.02.1989, 21°07.98'S, 167°54.69'E, 550 m : *M. notata*.
Station DW 478. — 22.02.1989, 21°08.96'S, 167°54.28'E, 400 m : *M. leagora*.
Station DW 480. — 22.02.1989, 21°08.50'S, 167°55.98'E, 380 m : *M. distiza, M. psylla*.
Station CP 481. — 23.02.1989, 21°21.85'S, 167°50.30'E, 300 m : *M. marini, M. notata, M. proto*.
Station DW 482. — 23.02.1989, 21°21.50'S, 167°46.80'E, 375 m : *M. moliae*.
Station DW 483. — 23.02.1989, 21°19.8'S, 167°47.8'E, 600 m : *M. pagesi*.
Station DW 485. — 23.02.1989, 21°23.48'S, 167°59.33'E, 350 m : *M. armilla*.
Station DW 487. — 23.02.1989, 21°23.30'S, 167°46.40'E, 500 m : *M. runcinata*.

Source : MNHN, Paris

Station DW 488. — 24.02.1989, 20°49.20'S, 167°06.44'E, 800 m : *M. eminens.*

VOLSMAR. **Matthew and Hunter Islands.**

Station DW 5. — 01.06.1989, 22°25.9'S, 171°46.5'E, 700 m : *M. armilla, M. psamathe.*
Station DW 6. — 01.06.1989, 22°27.2'S, 171°44.5'E, 480 m : *M. rufiantennulata.*
Station DW 7. — 01.06.1989, 22°26'S, 171°44.1'E, 400 m : *M. distiza, M. spilota, M. stigmatica.*
Station DW 8. — 08.06.1989, 22°21.6'S, 168°43.1'E, 420 m : *M. laurentae.*
Station DW 39. — 08.06.1989, 22°20.5'S, 168°43.5'E, 305 m : M. *urizae.*
Station DW 48. — 04.07.1989, 21°00.1'S, 170°03.5'E, 200 m : *M. gordoae.*
Station DW 50. — 04.07.1989, 20°59.1'S, 170°03.5'E, 425 m : *M. rufiantennulata, M. javieri.*
Station DW 51. — 04.07.1989, 20°58.5'S, 170°03.4'E, 450 m : *M. armilla, M. thoe, M. tuberculata.*
Station DW 52. — 04.07.1989, 20°59.1'S, 170°02.7'E, 510 m : *M. tuberculata.*
Station DW 60. — 05.07.1989, 20°59.3'S, 170°03.4'E, 190 m : *M. olivarae.*

CHALCAL 1. **Chesterfield Islands.**

Station DC 2. — 13.07.1984, 21°14.41'S, 162°16.27'E, 80-120 m : *M. belior, M. clinata, M. gordoae.*
Station DC 3. — 13.07.1984, 21°14.00'S, 162°16.40'E, 120-150 m : *M. gordoae, M. notata.*
Station DC 5. — 14.07.1984, 20°57.98'S, 161°45.36'E, 400 m : *M. moliae, M. notata.*
Station DC 14. — 16.07.1984, 19°26.90'S, 158°35.41'E, 246 m *M. notata.*
Station DC 29. — 18.07.1984, 19°30.60'S, 158°31.10'E, 100 m : *M. leptosyne.*
Station DC 30. — 18.07.1984, 19°31.10'S, 158°30.60'E, 150-180 m : *M. gordoae, M. tyche.*
Station DC 31. — 18.07.1984, 19°33.30'S, 158°30.30'E, 230 m : *M. notata.*
Station DC 32. — 19.07.1984, 19°43.22'S, 158°33.19 'E, 350 m : *M. notata, M. taenia.*
Station CP 38. — 19.07.1984, 19°43.80'S, 158°35.25'E, 348 m : *M. sphecia, M. taenia.*
Station DC 43. — 23.07.1984, 20°41.50'S, 158°38.40'E, 78 m : *M. clinata.*
Station DC 55. — 25.07.1984, 21°23.90'S, 158°59.60'E, 55 m : *M. clinata.*
Station DC 56. — 25.07.1984, 21°24.40'S, 159°08.80'E, 60 m : *M. clinata.*
Station DC 67. — 28.07.1984, 22°34.80'S, 159°09.40'E, 277 m : *M. stigmatica.*

MUSORSTOM 5. **Chesterfield Islands.**

Station DW 250. — 07.10.1986, 25°02.20'S, 159°59.90'E, 850 m : *M. notata.*
Station DW 255. — 07.10.1986, 25°15.40'S, 159°54.80'E, 280-295 m : *M. notata.*
Station DW 258. — 08.10.1986, 25°32.8'S, 159°46.10'E, 300 m : *M. pseliophora.*
Station DW 263. — 08.10.1986, 25°21.3'S, 159°46.44'E, 150-225 m : *M. notata.*
Station CP 267. — 08.10.1986, 25°23.60'S, 159°47.20'E, 285 m : *M. pseliophora.*
Station CP 268. — 09.10.1986, 24°44.70'S, 159°39.20'E, 280 m : *M. notata.*
Station CP 269. — 09.10.1986, 24°47.00'S, 159°37.30'E, 270-250 m : *M. notata.*
Station DW 273. — 09.10.1986, 24°43.02'S, 159°43.26'E, 290 m : *M. stigmatica.*
Station DW 274. — 09.10.1986, 24°44.83'S, 159°41.00'E, 285 m : *M. proto, M. pseliophora.*
Station CP 276. — 09.10.1986, 24°48.90'S, 159°40.90'E, 269-258 m : *M. rogeri.*
Station CP 278. — 10.10.1986, 24°10.80'S, 159°38.10'E, 265 m : *M. leagora.*
Station DW 280. — 10.10.1986, 24°09.99'S, 159°35.75'E, 270 m : *M. rogeri, M. sabatesae, M. stigmatica.*
Station DW 282. — 10.10.1986, 24°11.55'S, 159°32.22'E, 226-230 m : *M. proto.*
Station CP 287. — 10.10.1986, 24°05.40'S, 159°36.30'E, 270 m : *M. rogeri.*
Station CP 288. — 10.10.1986, 24°04.80'S, 159°36.80'E, 270 m : *M. rogeri.*
Station CP 289. — 10.10.1986, 24°01.50'S, 159°38.40'E, 273 m : *M. notata, M. rogeri.*
Station DC 291. — 11.10.1986, 23°07.70'S, 159°28.40'E, 300 m : *M. rogeri.*
Station DW 299. — 11.10.1986, 22°47.70'S, 159°23.70'E, 360-390 m : *M. rogeri, M. stigmatica.*
Station DW 300. — 11.10.1986, 22°48.27'S, 159°23.94'E, 450 m : *M. callista, M. leagora, M. notata, M. rufiantennulata, M. sphecia.*
Station DW 301. — 12.10.1986, 22°06.90'S, 159°24.60'E, 487-610 m : *M. leagora, M. notata, M. rufiantennulata, M. stia, M. urizae.*
Station DW 302. — 12.10.1986, 22°10.00'S, 159°23.30'E, 345-360 m : *M. stigmatica.*
Station DW 304. — 12.10.1986, 22°10.34'S, 159°25.51'E, 385-420 m : *M. notata.*

Source : MNHN, Paris

Station DW 305. — 12.10.1986, 22°09.27'S, 159°24.42'E, 430-440 m : *M. javieri, M. leagora, M. stia.*
Station DW 306. — 12.10.1986, 22°07.66'S, 159°21.40'E, 375-415 m : *M. laurentae, M. leagora, M. sphecia.*
Station CP 315. — 13.10.1986, 22°25.32'S, 159°27.40'E, 330-335 m : *M. bellior.*
Station CP 323. — 14.10.1986, 21°18.52'S, 157°57.62'E, 970 m : *M. eminens, M. microps.*
Station CP 324. — 14.10.1986, 21°15.01'S, 157°51.33'E, 970 m : *M. eminens, M. microps.*
Station DW 328. — 15.10.1986, 20°22.80'S, 158°43.60'E, 355-340 m : *M. notata.*
Station DW 329. — 15.10.1986, 20°22.90'S, 158°46.60'E, 320 m : *M. notata.*
Station CP 332. — 15.10.1986, 20°17.44'S, 158°48.86'E, 400 m : *M. leagora, M. notata, M. sphecia.*
Station DW 338. — 15.10.1986, 19°51.60'S, 158°40.40'E, 540-580 m : *M. laurentae, M. leagora.*
Station DW 339. — 16.10.1986, 19°53.40'S, 158°37,90'E, 380-395 m : *M. stia, M. taenia.*
Station DW 341. — 16.10.1986, 19°45.90'S, 158°43.37'E, 630-620 m : *M. incerta.*
Station DC 345. — 16.10.1986, 19°39.70'S, 158°32.40'E, 305-310 m : *M. notata, M. rogeri.*
Station DW 348. — 17.10.1986, 19°36.00'S, 158°31.70'E, 260 m : *M. gordoae, M. notata.*
Station DW 349. — 17.10.1986, 19°34.45'S, 158°34.48'E, 275 m : *M. notata.*
Station DW 354. — 18.10.1986, 19°31°06'S, 158°42.56'E, 420-450 m : *M. erato.*
Station DW 355. — 18.10.1986, 19°36.43'S, 158°43.41'E, 580 m : *M. ocyrhoe.*
Station DC 358. — 18.10.1986, 19°38.39'S, 158°47.17'E, 680-700 m : *M. incerta.*
Station CP 359. — 18.10.1986, 19°39.00'S, 158°49.00'E, 700-720 m : *M. hyalina, M. incerta.*
Station DC 361. — 19.10.1986, 19°52.50'S, 158°38.10'E, 400 m : *M. taenia, M. stia.*
Station DC 362. — 19.10.1986, 19°52.90'S, 158°40,00'E, 410 m : *M. stia.*
Station CP 363. — 19.10.1986, 19°47.90'S, 158°44.30'E, 700-685 m : *M. incerta.*
Station CP 364. — 19.10.1986, 19°45.30'S, 158°46.50'E, 675 m : *M. incerta.*
Station CC 365. — 19.10.1986, 19°42.82'S, 158°48.00'E, 710 m : *M. incerta.*
Station DC 368. — 20.10.1986, 19°52.30'S, 158°32,80'E, 305 m : *M. rogeri.*
Station DC 375. — 20.10.1986, 19°52.20'S, 158°29.70'E, 300 m : *M. notata.*
Station DC 378. — 20.10.1986, 19°53.74'S, 158°38.30'E, 355 m : *M. sphecia, M. taenia.*
Station CC 383. — 21.10.1986, 19°40.85'S, 158°46.10'E, 615-600 m : *M. incerta.*
Station DC 385. — 22.10.1986, 20°53.60'S, 160°49.40'E, 745-750 m : *M. andrewi.*
Station CP 386. — 22.10.1986, 20°56.21'S, 160°51.12'E, 770-755 m : *M. andrewi, M. rosula.*
Station CP 387. — 22.10.1986, 20°53.41'S, 160°52.14'E, 650-660 m : *M. andrewi, M. incerta, M. leviantennata, M. rosula.*
Station DC 388. — 22.10.1986, 20°45.35'S, 160°53.29'E, 500-510 m : *M. laurentae, M. marini.*
Station CP 389. — 22.10.1986, 20°44.95'S, 160°53.67'E, 500 m : *M. incerta.*
Station CC 390. — 22.10.1986, 21°00.90'S, 160°50.30'E, 745-825 m : *M. andrewi, M. eminens.*

CORAIL 2. **Chesterfield Islands.**

Station DW 3. — 20.07.1988, 20° 50.42'S, 161°34.19'E, 58 m : *M. clinata.*
Station CP 7. — 20.07.1988, 20°51.97'S, 161°36.94'E, 64 m : *M. leptosyne.*
Station DE 13. — 21.07.1988, 21°02.77'S, 160°55'E, 700-705 m : *M. andrewi, M. rhodonia, M. rosula.*
Station DE 14. — 21.07.1988, 21°00.69'S, 160°57.18'E, 650-660 m : *M. alonsoi, M. andrewi.*
Station DE 15. — 21.07.1988, 20°50.72'S, 160°55.25'E, 580-590 m : *M. andrewi, M. incerta.*
Station DE 16. — 21.07.1988, 20°47.75'S, 160°55.87'E, 500 m : *M. incerta, M. marini.*
Station CP 17. — 21.07.1988, 20°48.14'S, 160°57.14'E, 500 m : *M. incerta, M. marini.*
Station DW 93. — 27.08.1988, 19° 05.92'S, 158°53'E, 58-60 m : *M. clinata.*
Station DW 114. — 28.08.1988, 19°24.67'S, 150°37.78'E, 217 m : *M. notata.*
Station DW 129. — 29.08.1988, 19°27.74'S, 158°34.31'E, 215 m : *M. notata, M. thoe, M. tyche.*
Station CP 131. — 29.08.1988, 19°25.49'S, 158°37.96'E, 215-217 m : *M. notata, M. tyche.*
Station DW 141. — 30.08.1988, 19°33.95'S, 158°27.34'E, 95 m : *M. gordoae.*
Station CP 162. — 01.09.1988, 19°46.24'S, 158°25.67'E, 203-208 m : *M. pontoporea.*

MUSORSTOM 1. **Philippines.**

Station CP 40. — 24.03.1976, 13°57.4'N, 120°27.8'E, 265-287 m : *M. incerta.*
Station CP 50. — 25.03.1976, 13°49.2'N, 120°01.8'E, 415-510 m : *M. incerta, M. leviantennata.*
Station CP 51. — 25.03.1976, 13°49.4'N, 120°04.2'E, 170-200 m : *M. incerta.*
Station CP 57. — 26.03.1976, 13°53.1'N, 120°13.2'E, 96-107 m : *M. clinata, M. elegantissima.*

Source : MNHN, Paris

Station CP 62. — 27.03.1976, 13°59.5'N, 120°15.6'E, 179-194 m : *M. distiza, M. elegantissima.*
Station CP 63. — 27.03.1976, 14°00.8'N, 120°15.8'E, 191-195 m : *M. distiza.*

MUSORSTOM 2. **Philippines.**

Station CP 8. – 21.11.1980, 13°55'N, 120°20'E, 85-90 m : *M. elegantissima.*
Station CP 17. — 22.11.1980, 14°00.0'N, 120°17.1'E, 174-193 m : *M. distiza.*
Station CP 36. — 24.11.1980, 13°31.4'N, 121°23.9'E, 569-595 m : *M. rufiantennulata.*
Station CP 40. — 25.11.1980, 13°07.7'N, 122°39.1'E, 280-440 m : *M. incerta.*
Station CP 47. — 26.11.1980, 13°33.0'N, 122°10.1'E, 81-84 m : *M. clinata, M. elegantissima.*
Station CP 51. — 27.11.1980, 13°59.3'N, 120°16.4'E, 170-187 m : *M. distiza, M. rufiantennulata.*
Station CP 56. — 28.11.1980, 13°53.7'N, 119°56.3'E, 970 m : *M. microps.*
Station CP 75. — 01.12.1980, 13°50.5'N, 120°30.3'E, 300-330 m : *M. incerta.*
Station CP 83. — 02.12.1980, 13°55.2'N, 120°30.5'E, 318-320 m : *M. incerta.*

MUSORSTOM 3. **Philippines.**

Station CP 116. — 03.06.1985, 12°32.2'N, 120°46.4'E, 804-812 m : *M. eminens.*
Station DR 117. — 03.06.1985, 12°31.2'N, 120°39.3'E, 92-97 m : *M. clinata, M. elegantissima.*
Station CP 119. — 03.06.1985, 11°59.7'N, 121°12.7'E, 320-337 m : *M. incerta.*
Station CP 121. — 03.06.1985, 12°08.3'N, 121°17.3'E, 73-84 m : *M. clinata.*
Station CP 123. — 04.06.1985, 12°10.6'N, 121°45'E, 700-702 m : *M. incerta.*
Station CP 133. — 05.06.1985, 11°57.8'N, 121°52.25'E, 334- 390 m : *M. incerta, M. rufiantennulata.*
Station CP 134. — 05.06.1985, 12°01.1'N, 121°57.3'E, 92-95 m : *M. clinata.*
Station DR 137. — 06.06.1985, 12°03.5'N, 122°05.8'E, 56 m : *M. clinata.*
Station CP 144. — 07.06.1985, 12°01.6'N, 124°04.2'E, 379-383 m : *M. rufiantennulata.*

CORINDON 2. **Indonesia.**

Station CH 229. — 04.11.1980, 0°02.2'N, 119°49.8'E, 445-411 m : *M. leviantennata.*
Station CH 240. — 05.11.1980, 0°37.6'S, 119°33.5'E, 675 m : *M. eminens.*

SYSTEMATIC ACCOUNT

Key to the species of *Munida* from New Caledonia and adjacent waters

1. Fourth abdominal segment armed with dorsal spines 2
— Fourth abdominal segment spineless 17

2. Antennal peduncle spineless ..... ***M. leviantennata*** (p. 491)
— First and second antennal segments armed with spines 3

3. Fourth abdominal segment lacking spine on posterior ridge 4
— Fourth abdominal segment with spine on posterior ridge 7

4. Two spines on posterior transverse ridge of carapace 5
— No spines on posterior transverse ridge of carapace 6

5. Extensor margin of merus of third maxilliped with distal spine ..... ***M. laurentae*** (p. 483)
— Extensor margin of merus of third maxilliped unarmed ..... ***M. ocyrhoe*** (p. 503)

6. Three spines on lateral margins of carapace behind cervical groove. Second abdominal segment armed with 6 dorsal spines ..... ***M. sphecia*** (p. 531)
— Four spines on lateral margin of carapace behind cervical groove. Second abdominal segment armed with 4 dorsal spines ..... ***M. sabatesae*** (p. 525)

Source : MNHN, Paris

7. First antennal segment with unusually prolonged process **8**
— First antennal segment with moderate process **12**

8. Cardiac spines absent **9**
— Cardiac spines present **10**

9. Distomesial spine shorter than distolateral on basal antennular segment. Carapace with few secondary striae ..... ***M. andrewi*** (p. 445)
— Distomesial spine longer than distolateral on basal antennular segment. Carapace with numerous secondary striae ..... ***M. incerta*** (p. 748)

10. Median mesogastric spines absent ..... ***M. eminens*** (p. 466)
— Median mesogastric spine present **11**

11. Distomesial spine longer than distolateral on basal antennular segment. Thoracic sternites with numerous striae ..... ***M. callirrhoe*** (p. 453)
— Distomesial spine shorter than distolateral on basal antennular segment. Thoracic sternites with few striae ..... ***M. marini*** (p. 492)

12. Pair of protogastric spines behind pair of epigastric spines ..... ***M. soelae*** (p. 530)
— No protogastric spines **13**

13. Median spine on metagastric region ..... ***M. urizae*** (p. 551)
— No median spine on metagastric region **14**

14. Spines absent on cardiac region ..... ***M. yante*** (p. 555)
— One or several spines on cardiac region **15**

15. Transverse row of spinules on cardiac region ..... ***M. normani*** (p. 500)
— Prominent median spine on cardiac region **16**

16. Two spines on posterior transverse ridge of carapace ..... ***M. squamosa*** (p. 537)
— No spines on posterior transverse ridge of carapace ..... ***M. spinicordata*** (p. 534)

17. Three or four spines on lateral margins of carapace behind cervical groove **18**
— Five spines on lateral margins of carapace behind cervical groove **31**

18. Abdominal segments unarmed **19**
— Second abdominal segment with spines **24**

19. Distal spine on flexor border of carpus of third maxilliped. Epipods on first to third pereiopods **20**
— Carpus of third maxilliped unarmed. Epipods absent on all pereiopods **21**

20. Distal spine on extensor margin of merus of third maxilliped. Third antennal segment with distolateral spine ..... ***M. elegantissima*** (p. 465)
— Extensor margin of merus of third maxilliped unarmed. Third antennal segment unarmed.. ..... ***M. bellior*** (p. 450)

21. Lateral parts of fifth to seventh thoracic sternites with distinct carinae .... ***M. psylla*** (p. 517)
— Lateral parts of fifth to seventh thoracic sternites without carinae **22**

22. Lateral parts of seventh thoracic sternite with small granules. Distomesial spine on basal antennular segment shorter than distolateral. Distomesial spine on basal antennal segment well developed, reaching end of second segment ..... ***M. hyalina*** (p. 477)
— Lateral parts of seventh thoracic sternite without granules. Distal spines on basal antennular segment subequal. Distomesial spine on basal antennal segment short, not reaching end of second segment **23**

Source : MNHN, Paris

23. External orbital spine on carapace long, situated at anterolateral angle. Carapace with numerous secondary striae and scales ..... ***M. callista*** (p. 454)
— External orbital spine on carapace small, situated on frontal margin between supraocular spine and anterolateral angle. Carapace with few secondary striae ..... ***M. javieri*** (p. 480)

24. Lateral parts of posterior thoracic sternites with granules or carinae **25**
— Lateral parts of posterior thoracic sternites without granules or carinae **28**

25. Lateral parts of posterior thoracic sternites with distinct carinae .....
..... ***M. rufiantennulata*** (p. 523)
— Lateral parts of posterior thoracic sternites with granules **26**

26. Lateral parts of thoracic sternites 6 and 7 with many small granules .....
..... ***M. rogeri*** (p. 518)
— Lateral parts of thoracic sternite 7 with some coarse granules **27**

27. Distomesial spine on basal antennular segment longer than distolateral .....
..... ***M. leptosyne*** (p. 489)
— Distomesial spine on basal antennular segment shorter than distolateral .....
..... ***M. gordoae*** (p. 469)

28. Distomesial spine on basal antennular segment distinctly shorter than distolateral. Fingers of cheliped unarmed ..... ***M. psamathe*** (p. 513)
— Distal spines on basal antennular segment subequal or slightly different in size. Fixed finger of cheliped with spines along lateral border **29**

29. Distal half of ventral border of dactylus of walking legs unarmed ..... ***M. masi*** (p. 495)
— Dactylus of walking legs with movable spinules along entire ventral border **30**

30. Antennular peduncle exceeding cornea..... ***M. erato*** (p. 466)
— Antennular peduncle ending at same level of cornea ..... ***M. zebra*** (p. 556)

31. Eye small, cornea barely wider than eyestalk. Maximum corneal diameter less than 1/5 length of anterior border of carapace between external orbital spines **32**
— Eye large, cornea dilated. Maximum corneal diameter equal to or greater than 1/4 length of anterior border of carapace between external orbital spines **34**

32. Distomesial spine on basal antennal segment well developed, reaching end of second segment ..... ***M. typhle*** (p. 549)
— Distomesial spine on basal antennal segment very small, distinctly not reaching end of second segment **33**

33. External orbital and second lateral spines on carapace before cervical groove small, subequal; first spine much mesial than second.. ..... ***M. tiresias*** (p. 545)
— External orbital spine on carapace well developed, distinctly longer than second lateral spine and situated at anterolateral angle ..... ***M. magniantennulata***

34. Abdominal segments unarmed or with spines on each side of anterior ridge on second tergite **35**
— Abdominal segments with median pair of spines or with spines along anterior ridge of second tergite **52**

35. Lateral parts of seventh thoracic sternite with granules ..... ***M. stigmatica*** (p. 538)
— Lateral parts of seventh thoracic sternite without granules **36**

36. Distal spines on basal antennular segment subequal **37**
— Distal spines on basal antennular segment of different length **43**

37. Extensor margin of merus of third maxilliped with distal spine **38**
— Extensor margin of merus of third maxilliped unarmed **41**

Source : MNHN, Paris

38. Frontal margins distinctly oblique ..... *M. clinata* (p. 457)
— Frontal margins transverse **39**

39. Dorsal carapace surface armed only with epigastric spines ..... *M. runcinata* (p. 525)
— Dorsal carapace surface armed with other spines, in addition to epigastric spines. **40**

40. Dactylus of walking legs with spines along entire ventral border. Thoracic sternites with few striae ..... *M. spilota* (p. 533)
— Dactylus of walking legs unarmed on terminal third of ventral margin. Thoracic sternites with numerous striae ..... *M. sao* (p. 436)

41. Distomesial spine on second antennal segment not exceeding antennal peduncle ..... *M. brachytes* (p. 450)
— Distomesial spine on second antennal segment distinctly exceeding antennal peduncle **42**

42. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines ..... *M. leagora* (p. 485)
— Eye small, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines ..... *M. pseliophora* (p. 515)

43. Distomesial spine on basal antennular segment longer than distolateral **44**
— Distomesial spine on basal antennular segment shorter than distolateral **48**

44. Extensor margin of merus of third maxilliped with distal spine **45**
— Extensor margin of merus of third maxilliped unarmed **47**

45. Frontal margins distinctly oblique ..... *M. olivarae* (p. 505)
— Frontal margins transverse **46**

46. Distomesial spine on basal antennal segment distinctly exceeding antennal peduncle. Dactylus of walking legs with spines along entire ventral border ... *M. acantha* (p. 440)
— Distomesial spine on basal antennal segment not exceeding antennal peduncle. Terminal third of ventral margin of dactylus of walking legs unarmed ..... *M. notata* (p. 500)

47. Eye large, maximum corneal diameter more than 1/3 length of anterior border of carapace between bases of external orbital spines. Antennular peduncle not exceeding cornea .... *M. moliae* (p. 499)
— Eye moderately large, maximum corneal diameter less than 1/3 length of anterior border of carapace between bases of external orbital spines. Antennular peduncle distinctly exceeding cornea ..... *M. abelloi* (p. 438)

48. Rostrum as long as remaining carapace ..... *M. barangei* (p. 449)
— Rostrum shorter than remaining carapace **49**

49. Fixed finger of cheliped unarmed ..... *M. alonsoi* (p. 443)
— Fixed finger of cheliped with spines along lateral border **50**

50. Chelipeds and walking legs long and slender. First walking leg about 2.5 times carapace length ..... *M. proto* (p. 509)
— Chelipeds and walking legs short. First walking leg about 2 times carapace length ... **51**

51. Dactylus of walking legs with spines along nearly entire ventral border. Cheliped movable finger with only basal spine ..... *M. leptitis* (p. 487)
— Terminal third of dactylus of walking legs unarmed. Cheliped movable finger with spines along mesial border ..... *M. stia* (p. 537)

52. Lateral parts of posterior thoracic stemites with granules **53**
— Lateral parts of posterior thoracic sternites without granules **60**

Source : MNHN, Paris

53. Lateral parts of thoracic sternites 6 and 7 with granules **54**
— Lateral parts of thoracic sternite 7 with some coarse granules **58**

54. Lateral parts of thoracic sternites covered with many small granules **55**
— Lateral parts of thoracic sternites with a few coarse granules **57**

55. Extensor margin of merus of third maxilliped with distal spine. Antennular peduncle not exceeding cornea ..... ***M. taenia*** (p. 541)
— Extensor margin of merus of third maxilliped unarmed. Antennular peduncle distinctly exceeding cornea **56**

56. Granules on thoracic sternites 6 and 7 forming lines. Distal spines on basal antennular segment subequal ..... ***M. lineola*** (p. 491)
— Granules on thoracic sternites 6 and 7 homogeneously scattered. Distomesial spine on basal antennular segment longer than distolateral ..... ***M. pontoporea*** (p. 509)

57. Distomesial spine on basal antennal segment slightly longer than distolateral. One basal and one distal spines on mesial margin of cheliped movable finger .... ***M. idyia*** (p. 477)
— Distal spines on basal antennat segment subequal. Several spines along proximal half of mesial border of cheliped movable finger ..... ***M. tyche*** (p. 549)

58. Extensor margin of merus of third maxilliped with distal spine .... ***M. guttata*** (p. 471)
— Extensor margin of merus of third maxilliped unarmed **59**

59. One row of spines along mesial margin of cheliped movable finger. Distomesial spine on basal antennular segment longer than distolateral ..... ***M. distiza*** (p. 459)
— One basal spine on mesial margin of cheliped movable finger. Distomesial spine on basal antennular segment shorter than distolateral..... ***M. armilla*** (p. 446)

60. Rostrum laterally compressed **61**
— Rostrum spiniform **62**

61. Thoracic sternites with numerous striae. Second abdominal segment with numerous transverse striae ..... ***Munida* sp.** (p. 558)
— Thoracic sternites smooth, striae nearly absent. Second abdominal segment with few transverse striae ..... ***M. cornuta*** (p. 459)

62. Basal antennal segment without distomesial spine ..... ***M. amblytes*** (p. 443)
— Basal antennal segment with well developed distomesial spine **63**

63. Antennal peduncle small ..... ***M. tuberculata*** (p. 547)
— Antennal peduncle well developed **64**

64. Distal spines on basal antennular segment subequal **65**
— Distal spines on basal antennular segment differing in length **70**

65. Two median spines on anterior border of second abdominal segment ..... ***M. inornata***
— Six or more spines along anterior border of second abdominal segment **66**

66. Terminal third of ventral margin of dactylus of walking legs unarmed .....
..... ***M. semoni*** (p. 530)
— Dactylus of walking tegs with spines along entire ventral margin **67**

67. Fingers of cheliped with subterminal spines only and, if present, one basal spine on fixed finger **68**
— Fingers of cheliped with several spines in addition to subterminal spines **69**

68. Carapace with few secondary striae between main striae. Chelipeds moderately long and slender ..... ***M. rosula*** (p. 521)

Source : MNHN, Paris

— Carapace with numerous secondary striae belween main striae. Chelipeds short and massive ..... ***M. rhodonia*** (p. 517)

69. Second abdominal segment with one transverse stria. Dactylus of walking legs long, slightly shorter than propodus ..... ***M. elachia*** (p. 465)

— Second abdominal segment with numerous transverse striae. Dactylus of walking legs short, half as long as propodus ..... ***M. thoe*** (p. 542)

70. Distolateral spine on basal antennular segment longer than distomesial **71**
— Distolateral spine on basal antennular segment shorter lhan dislomesial **75**

71. Terminal third of ventral border of dactylus of walking legs unarmed **72**
— Dactylus of walking legs with spines along entire ventral border **73**

72. Second abdominal segment with numerous transverse striae. Fourth and fifth thoracic sternites with numerous short arcuate striae. ..... ***M. pagesi*** (p. 507)
— Second abdominal segment with 2 striae. Thoracic sternites smooth, without striae ..... ***M. sacksi***

73. Fixed finger of cheliped with a row of spines along lateral margin ..... ***M. eclepsis*** (p. 463)
— Fixed finger of cheliped unarmed or with only one spine in addition to subterminal spines **74**

74. Antennular peduncle not exceeding cornea. Eye large, maximal corneal diameter 1/2 length of anterior border of carapace between bases of external orbilal spines ..... ***M. militaris*** (p. 496)
— Antennular peduncle distinctly exceeding cornea. Eye moderately large, maximal corneal diameter 1/4 length of anterior border of carapace between bases of external orbital spines . ..... ***M. microps*** (p. 496)

75. Merus of third maxilliped with extensor margin armed with distal spine. Third abdominal segment unarmed ..... ***M. haswelli*** (p. 474)
— Merus of third maxilliped with extensor margin unarmed. Third abdominal segment with dorsal spines ..... ***M. gracilis*** (p. 471)

Munida abelloi sp. nov.

Fig. 1

MATERIAL EXAMINED. — **Kiribati**, 400 m, 04.1987 : 1 ♂ 16.6 mm, holotype (MNHN-Ga 2528).

ETYMOLOGY. — This species is dedicated to P. ABELLÓ, of the Instituto de Ciencias del Mar, Barcelona, for his support in my works on crustaceans.

DESCRIPTION. — Carapace with secondary striae. Intestinal region with one scale. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few striae; fifth to seventh smooth. Abdominal segments unarmed. Second and third segments with several transverse striae. Two pairs of gonopods present on first and second abdominal segments. Eye moderately large, maximum corneal diameter less than 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) distinctly exceeding cornea, distomesial spine longer than distolateral. Distomesial spine on first segment of antennal peduncle reaching end of third segment; distomesial spine on second segment slightly exceeding antennal peduncle. Extensor border of merus of third

Source : MNHN, Paris

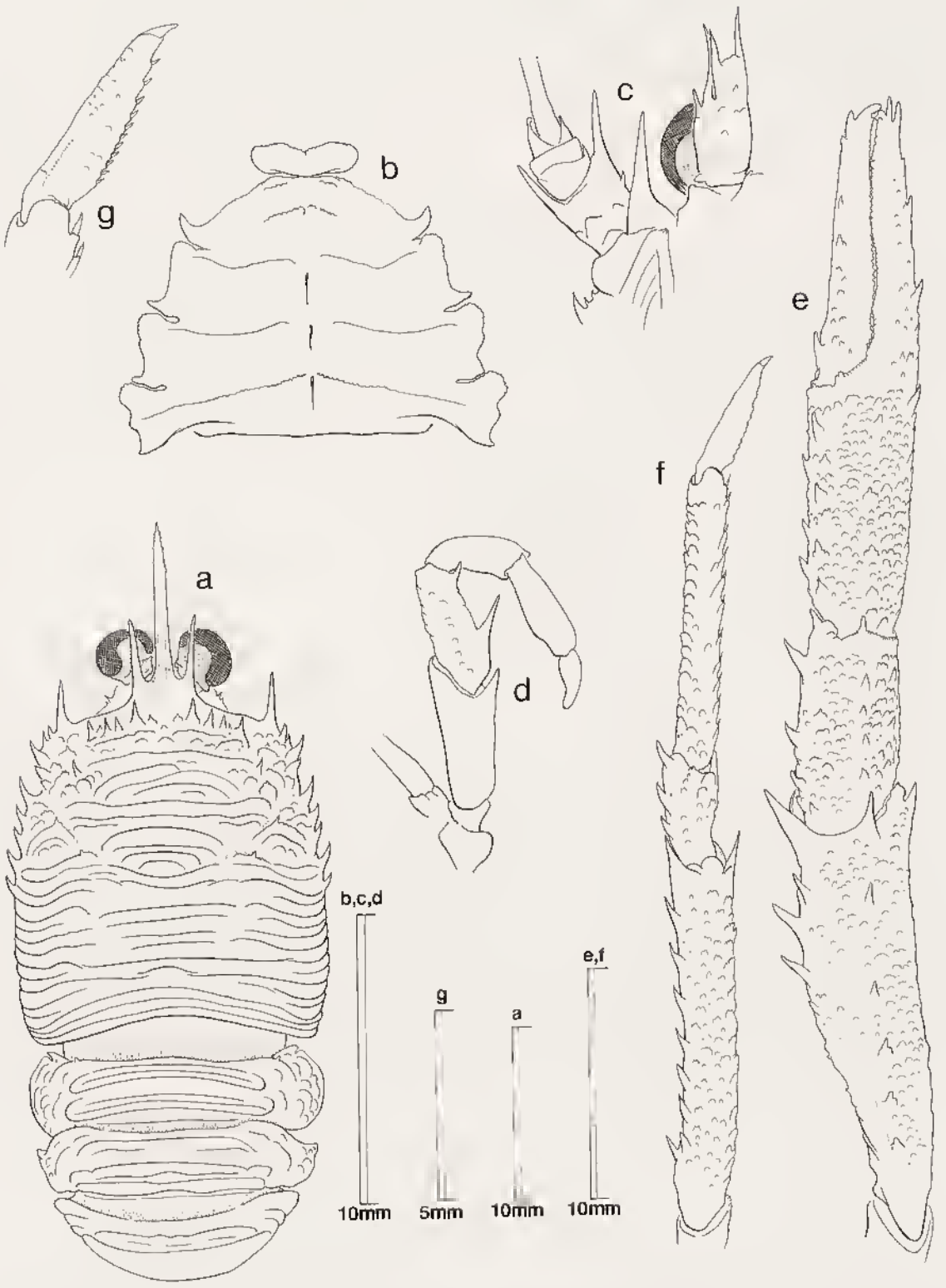

FIG. 1. — *Munida abelloi* sp. nov., ♂ 16.6 mm, holotype from Kiribati : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

maxilliped unarmed. Fixed margin. Dactylus of walking legs 1/2 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. abelloi* is close to *M. moliae* sp. nov. from New Caledonia and Loyalty Islands (see below under the Remarks of that species).

DISTRIBUTION. — Kiribati, 400 m.

Munida acantha sp. nov.

Figs 2, 64

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 38, 360 m : 1 ♀ 7.3 mm (MNHN-Ga 2529).

MUSORSTOM 4 : stn 148, 59 m : 9 ♂ 6.0 to 9.4 mm; 4 ov. ♀ 8.7 to 9.8 mm (MNHN-Ga 3252). — Stn 163, 350 m : 1 ♂ 5.9 mm; 1 ♀ 4.7 mm (MNHN-Ga 2530). — Stn 164, 250 m : 1 ♀ 8.5 mm (MNHN-Ga 3253). — Stn 183, 280 m : 6 ♂ 7.0 to 11.4 mm; 5 ov. ♀ 8.7 to 10.3 mm (USNM). — Stn 193, 430 m : 7 ♂ 6.5 to 12.6 mm; 7 ov. ♀ 7.6 to 10.4 mm; 3 ♀ 9.8 to 10.5 mm (MNHN-Ga 3254). — Stn 196, 450 m : 7 ♂ 6.5 to 11.6 mm; 3 ov. ♀ 8.4 to 11.0 mm; 1 ♀ 10.7 mm (MNHN-Ga 2532, 2533).

SMIB 2 : stn 6, 442-460 m : 1 ♂ 7.0 mm; 1 ov. ♀ 8.0 mm (MNHN-Ga 2534).

CHALCAL 2 : stn 81, 311 m : 2 ♂ 5.8 and 11.6 mm; 1 ♀ 10.9 mm (MNHN-Ga 2535).

SMIB 5 : stn 87, 335-370 m : 2 ♀ 4.5 and 6.0 mm (MNHN-Ga 3255). — Stn 104, 330 m : 3 ov. ♀ 8.2 to 9.3 mm; 1 ♀ 6.0 mm (MNHN-Ga 3256).

SMIB 6 : stn 118, 290-300 m : 1 ♀ 6.0 mm (MNHN-Ga 2537).

Loyalty Islands. MUSORSTOM 6 : stn 472, 300 m : 1 ov. ♀ 6.0 mm (MNHN-Ga 2536).

Atoll de Surprise : stn 444, 28.02.1985, 18°15'S, 162°59'E, 300-350 m : 13 ♂ 6.7 to 12.0 mm; 5 ♀ 5.0 to 10.0 mm (MNHN-Ga 3257).

TYPES. — The male of 11.6 mm from MUSORSTOM 4, Stn 196 (MNHN-Ga 2532) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *acantha*, spine, in reference to the long distomesial spine on the basal antennal segment. The name is considered as a substantive in apposition.

DESCRIPTION. — Carapace with secondary striae. Intestinal region without scales. External orbital spine long situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh without striae. Second abdominal segment with 2-3 spines on each side. Second and third segments each with 3-4 transverse striae. Males with two pairs of gonopods. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) ending at same level of cornea, distomesial spine longer than distolateral. Distomesial spine on first and second segments of antennal peduncle exceeding antennal peduncle. Extensor border of merus of third maxilliped with small distal spine. Fixed and movable fingers of cheliped with a row of spines along lateral and mesial borders, respectively. Dactylus of walking legs less than half as long as propodus, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments light orange. Rostrum and supraocular spines light orange. Second to fourth abdominal segments with some red spots. Chelipeds missing in specimens photographed. Walking legs whitish with small red spots; dactylus pinkish.

REMARKS. — *M. acantha* is closely related to *M. notata* sp. nov. from New Caledonia, Loyalty Islands and Chesterfield Islands. The relationships are discussed in the Remarks under this latter species (see below).

SIZE. — The males examined ranged between 5.8 and 12.6 mm, females between 4.5 and 11.4 mm; ovigerous females from 6.0 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Atoll de Surprise, between 59 and 460 m.

Source : MNHN, Paris

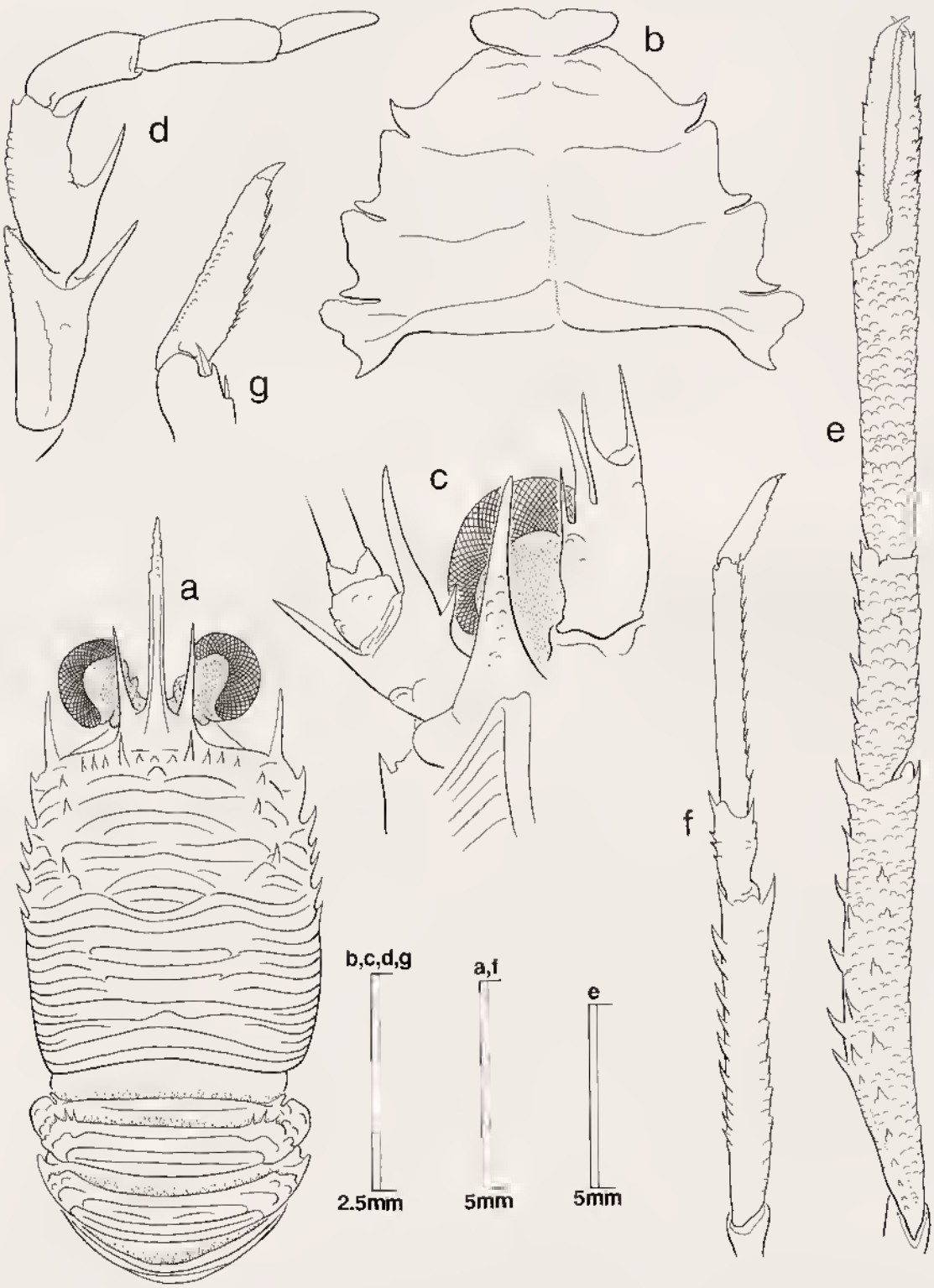

FIG. 2. — *Munida acantha* sp. nov., ♂ 11.6 mm, holotype from Stn 196 (MUSORSTOM 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

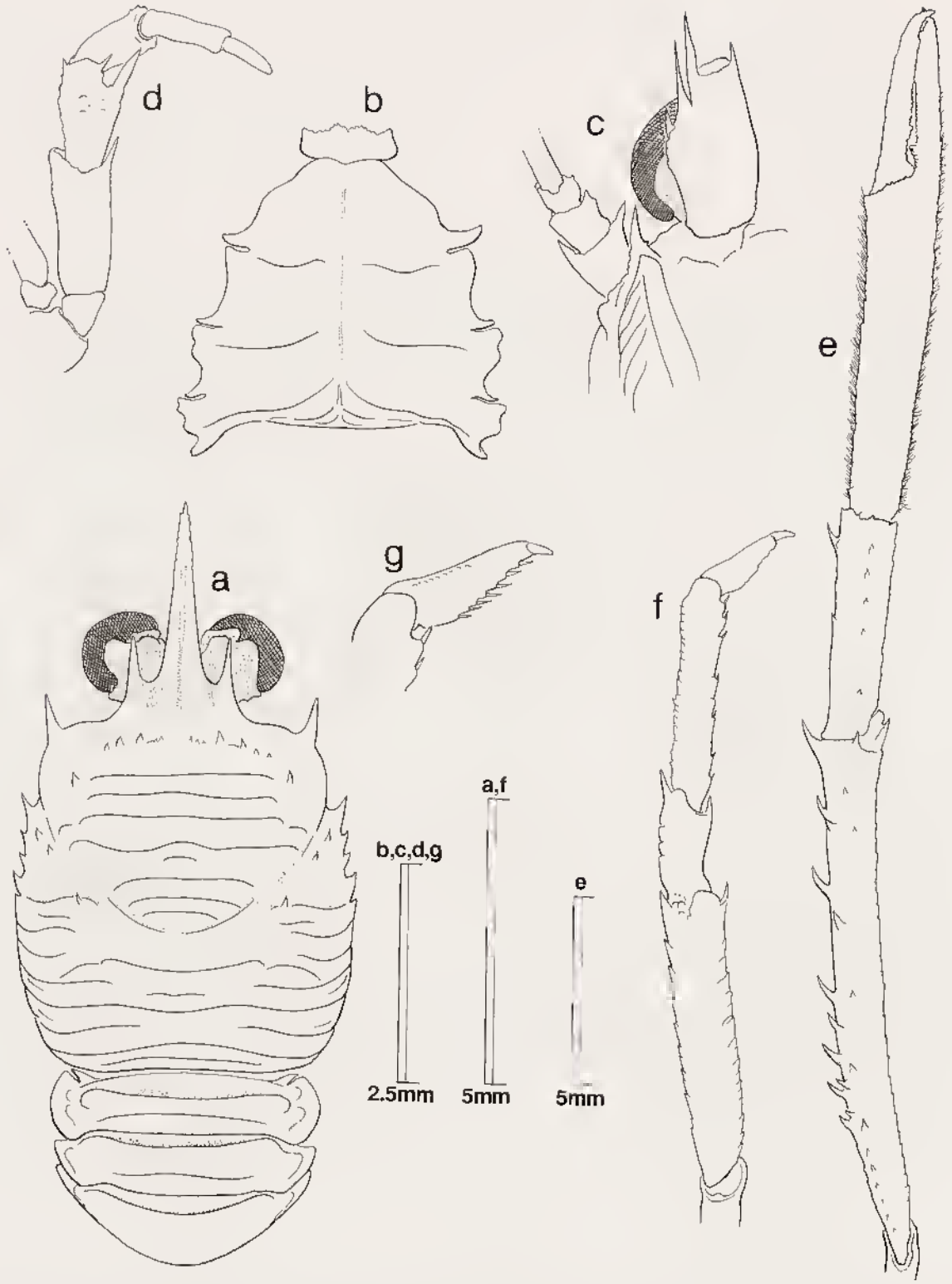

FIG. 3. — *Munida alonsoi* sp. nov., ♂ 5.6 mm, holotype from Stn 12 (SMIB 3) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

Munida alonsoi sp. nov.

Fig. 3

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 36, 650-680 m : 1 ♂ 3.6 mm; 3 ov. ♀ 3.5 to 5.3 mm (MNHN-Ga 2538). — Stn 46, 570-610 m : 5 ♂ 3.8 to 4.2 mm; 5 ov. ♀ 2.8 to 3.7 mm; 5 ♀ 2.8 to 3.2 mm (MNHN-Ga 2539).

MUSORSTOM 4 : stn 216, 490-515 m : 1 ♂ 5.9 mm (MNHN-Ga 2540). — Stn 220, 505-550 m : 2 ov. ♀ 3.7 and 4.5 mm (MNHN-Ga 2541). — Stn 221, 535-560 m : 3 ♀ 3.6 to 4.5 mm (MNHN-Ga 3504).

SMIB 2 : stn 18B, 530-535 m : 1 ♂ 6.3 mm (USNM).

CHALCAL 2 : stn 73, 573 m : 1 ov. ♀ 3.2 mm (MNHN-Ga 2543). — Stn 74, 470 m : 4 ♂ 2.7 to 3.6 mm; 5 ov. ♀ 2.7 to 4.0 mm (MNHN-Ga 2544). — Stn 75, 600 m : 1 ♂ 4.6 mm; 3 ov. ♀ 3.6 to 3.9 mm (MNHN-Ga 2545). — Stn 76, 470 m : 26 ♂ 2.7 to 5.8 mm; 25 ov. ♀ 2.2 to 4.2 mm; 4 ♀ 3.0 to 3.5 mm (MNHN-Ga 2546 and USNM).

SMIB 3 : stn 12, 470 m : 3 ♂ 3.3 to 5.6 mm (MNHN-Ga 2547, 2548). — Stn 13, 448 m : 1 ♂ 5.2 mm; 1 ♀ 4.9 mm (MNHN-Ga 2549).

Chesterfield Islands. CORAIL 2 : stn 14, 650-660 m : 1 ov. ♀ 3.3 mm (MNHN-Ga 2550).

TYPES. — One male of 5.6 mm from SMIB 3, Stn 12 (MNHN-Ga 2547) has been selected as the holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to M. A. ALONSO-ZARAZAGA, of the Museo Nacional de Cienciias Naturales in Madrid, for his support of taxonomy.

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines, fifth spine very small. Thoracic sternites without striae. Abdominal segments unarmed. Second and third abdominal segments each with one transverse stria. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (without distal spines) ending at same level of cornea, distomesial spine small distinctly shorter than distolateral. Distomesial spine on first segment of antennal peduncle reaching end of second segment; distomesial spine on second segment not reaching end of third segment. Extensor border of merus of third maxilliped with small distal spine. Fingers of cheliped without spines. Dactylus of walking legs short, 1/2 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. alonsoi* is closely related to *M. barangei* sp. nov. from New Caledonia. Several features readily distinguish these two species (see Remarks under *M. barangei*).

SIZE. — The males examined ranged between 2.7 and 6.3 mm; females between 2.2 and 5.3 mm; ovigerous females from 2.2 mm.

DISTRIBUTION. — New Caledonia and Chesterfield Islands, between 448 and 680 m.

Munida amblytes sp. nov.

Fig. 4

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 46, 570-610 m : 3 ♂ 5.5 to 14.0 mm; 1 ov. ♀ 8.6 mm (MNHN-Ga 2551 and USNM). — Stn 52, 540-600 m : 1 ♂ 14.2 mm (MNHN-Ga 3258). — Stn 54, 1000 m : 1 ov. ♀ 12.7 mm (MNHN-Ga 2552).

CHALCAL 2 : stn 74, 650 m : 1 ♀ 4.6 mm (MNHN-Ga 2553).

SMIB 3 : stn 21, 525 m : 1 ♂ 12.4 mm (MNHN- Ga 3259). — Stn 23, 530 m : 2 ♂ 16.0 and 17.4 mm (MNHN-Ga 2554, 2555).

TYPES. — The male of 16.0 mm from SMIB 3, Stn 23 (MNHN-Ga 2554) has been selected as holotype; the other specimens are paratypes.

Source : MNHN, Paris

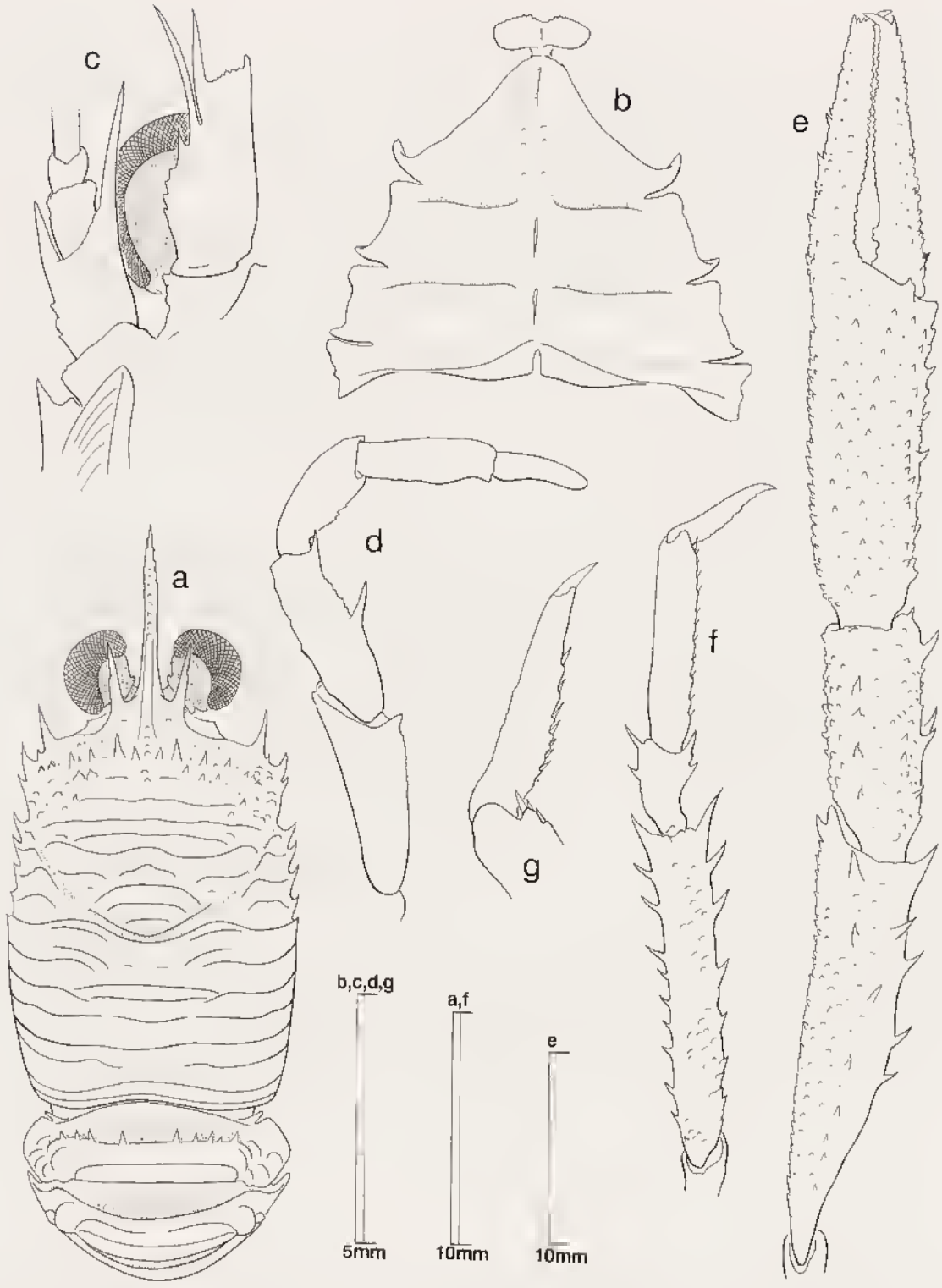

FIG. 4. — *Munida amblytes* sp. nov., ♂ 16.0 mm, holotype from Stn 23 (SMIB 3) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

ETYMOLOGY. — From the Greek, *amblytes*, blunt, in reference to the absence of spines on the basal antennal segment. The name is considered as a substantive in apposition.

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae, anterior-mesially hollowed; fifth to seventh sternites smooth. Second abdominal tergite with a row of 8-10 spines on anterior ridge. Second and third abdominal segments each with 1-2 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) slightly exceeding cornea, distomesial spine shorter than distolateral. First segment of antennal peduncle unarmed; distomesial spine on second segment distinctly exceeding antennal peduncle. Extensor margin of merus of third maxilliped unarmed. Movable finger of cheliped with one basal and one distal spine on mesial border; fixed finger with a row of spines along lateral margin. Dactylus of walking legs about 1/2 length of propodus, with movable spinules along ventral margin, terminal third unarmed.

REMARKS. — *M. amblytes* is close to *M. prominula* Baba from the Philippines (BABA, 1988; MACPHERSON, 1993). The two species differ in the following constant features :

— The third abdominal segment in *M. prominula* bears dorsal spines which are absent in *M. amblytes*.

— Both the distal two spines on the basal antennular segment are well developed in *M. prominula*, whereas the distomesial spine is very reduced in *M. amblytes*.

— *M. prominula* has the basal antennal segment with a dislomesial spine, which is absent in the new species.

— The movable finger of the cheliped bears several spines on the proximal half of the mesial border in *M. prominula*, whereas *M. amblytes* has only one basal spine.

SIZE. — The males examined ranged between 5.5 and 17.4 mm, females between 4.6 and 12.7 mm; ovigerous females from 8.6 mm.

DISTRIBUTION. — New Caledonia, between 525 and 1000 m.

Munida andrewi sp. nov.

Fig. 5

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 198, 590 m : 1 ♂ 7.8 mm (MNHN-Ga 2929).

Chesterfield Islands. MUSORSTOM 5 : stn 385, 745-750 m : 1 ♂ 12.3 mm; 2 ♀ 12.1 and 13.4 mm (MNHN-Ga 2933). — Stn 386, 755-770 m : 7 ♂ 13.5 to 14.5 mm; 3 ♀ 14.0 to 16.4 mm (MNHN-Ga 2934, 2935). — Stn 387, 650-660 m : 1 ♂ 15.0 mm; 1 ♀ 14.4 mm (MNHN-Ga 2936). — Stn 390, 745-825 m : 14 ♂ 12.1 to 16.4 mm; 11 ♀ 12.6 to 17.4 mm (MNHN-Ga 2937).

CORAIL 2 : stn 13, 700-705 m : 11 ♂ 12.4 to 17.3 mm; 1 ov. ♀ 15.4 mm; 1 ♀ 11.0 mm (MNHN-Ga 2930). — Stn 14, 650-660 m : 1 ♀ 8.0 mm (MNHN-Ga 2931). — Stn 15, 580-590 m : 1 ov. ♀ 12.3 mm (MNHN-Ga 2932).

TYPES. — One male of 14.4 mm from MUSORSTOM 5, Stn 386 (MNHN-Ga 2934) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to Andrew I. L. PAYNE, of the Sea Fisheries Research Institute, Cape Town, for his continuous support in my research work.

DESCRIPTION. — Carapace with pair of epigastric spines behind supraoculars. Transverse striae conspicuous, secondary striae nearly absent. Three spines in a row on each branchiocardiac boundary, anteriormost postcervical, larger than remainder. External orbital spine pronounced, situated at anterolateral angle of carapace. Branchial margin with 4 spines. Fourth thoracic sternite with several short arcuate striae; fifth to seventh sternites smooth. Second, third and fourth abdominal segments each with 4 equal sized spines on anterior transverse ridge; posterior ridge of fourth segment with strong median spine. Gonopods in males absent from first abdominal segment. Eye dilated, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital

Source : MNHN, Paris

spines. Basal antennular segment (distal spines excluded) not exceeding eye, distolateral spine larger than distomesial. Distomesial prolongation of first antennal segment well developed, reaching rostral tip; second segment with 2 distal small spines; third segment unarmed. Flexor margin of merus of third maxitliped with median spine; small distal spine on extensor border. Fingers of cheliped unarmed; fixed finger bifid distally. Dactylus of walking legs half as long as propodus, with small median spinules on ventral border.

REMARKS. — *Munida andrewi* is closely related to *M. incerta* Henderson, 1888, from the Indian and West Pacific waters (see above and BABA, 1988, 1990). Both species are easily differentiated by several characters :

— The carapace and abdomen have numerous secondary striae in *M. incerta*. These striae are nearly absent in the new species. The principal striae are very conspicuous in the new species, whereas in *M. incerta* they are quite similar to secondary striae.

— The thoracic sternites bear numerous striae in *M. incerta*, these striae are practically absent in *M. andrewi*.

— The distomesial spine on the basal antennular segment is much longer than the distolateral in *M. incerta*; this spine is small and distinctly shorter than the distolateral spine in *M. andrewi*.

— The second antennal segment has one small median spine on the mesial border in *M. incerta*. This spine is always absent in *M. andrewi*.

— The chelipeds and walking legs are slender and less squamate in the new species than in *M. incerta*.

SIZE. — The males examined ranged between 7.8 and 17.3 mm, females between 8.0 and 17.4 mm; ovigerous females from 12.3 mm.

DISTRIBUTION. — New Caledonia and Chesterfield Islands, from 580 to 825 m.

Munida armilla sp. nov.

Figs 6, 65

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 8, 435 m : 1 ov. ♀ 7.0 mm (MNHN-Ga 2556). — Stn 67, 500 m : 1 ♂ 11.6 mm (MNHN-Ga 3260).

MUSORSTOM 4 : stn 158, 625 m : 1 ♂ 8.0 mm (MNHN-Ga 2557).

CHALCAL 2 : stn 1, 500 m : 17 ♂ 10.6 to 14.7 mm; 3 ov. ♀ 7.9 to 13.8 mm; 1 ♀ 10.7 mm (MNHN-Ga 2558, 2559). — Stn 2, 500 m : 4 ♂ 7.7 to 11.4 mm; 2 ov. ♀ 8.0 and 9.8 mm (MNHN-Ga 2560). — Stn 21, 500 m : 22 ♂ 6.4 to 11.3 mm; 8 ov. ♀ 6.3 to 12.2 mm; 2 ♀ 6.1 and 6.6 mm (MNHN-Ga 3261). — Stn 72, 527 m : 33 ♂ 6.8 to 11.7 mm; 15 ov. ♀ 7.1 to 9.3 mm; 1 ♀ 5.7 mm (MNHN-Ga 2561). — Stn 73, 573 m : 10 ♂ 5.8 to 11.1 mm; 4 ov. ♀ 5.6 to 7.3 mm; 1 ♀ 7.0 mm (MNHN-Ga 2562). — Stn 74, 650 m : 32 ♂ 4.6 to 11.0 mm; 5 ov. ♀ 6.6 to 7.3 mm; 10 ♀ 3.2 to 8.8 mm (MNHN-Ga 2563). — Stn 75, 600 m : 5 ♂ 4.7 to 8.8 mm; 5 ov. ♀ 6.4 to 9.3 mm; 2 ♀ 5.0 and 6.0 mm (MNHN-Ga 2564 and USNM).

SMIB 3 : stn 1, 520 m : 10 ♂ 5.5 to 13.5 mm; 11 ov. ♀ 7.4 to 10.0 mm (MNHN-Ga 2565). — Stn 3, 530 m : 8 ♂ 7.0 to 10.3 mm; 2 ov. ♀ 8.5 and 10.7 mm; 1 ♀ 7.2 mm (MNHN Ga 2566). — Stn 4, 530 m : 2 ♂ 8.1 and 8.6 mm; 4 ov. ♀ 7.6 to 9.3 mm (MNHN-Ga 3263). — Stn 7, 505 m : 3 ♂ 9.6 to 13.4 mm; 4 ov. ♀ 8.0 to 12.0 mm (MNHN-Ga 3262). — Stn 8, 233 m : 1 ♂ 8.8 mm; 1 ov. ♀ 10.0 mm (MNHN-Ga 2567).

BIOGEOCAL : stn 307, 470-480 m : 1 ov. ♀ 6.9 mm (MNHN-Ga 2568).

SMIB 3: stn 2, 530 m : 7 ♂ 7.1 to 10.2 mm; 5 ov. ♀ 7.1 to 11.9 mm; 1 ♀ 8.0 mm (MNHN-Ga 3267).

SMIB 4 : stn 34, 515 m : 7 ♂ 9.7 to 13.3 mm; 2 ♀ 10.0 and 11.3 mm (MNHN-Ga 2569). — Stn 36, 530 m : 2 ♂ 7.4 and 10.5 mm (MNHN-Ga 3264). — Stn 37, 540 m : 8 ♂ 9.5 to 14.0 mm; 6 ♀ 9.1 to 15.8 mm (MNHN-Ga 3265). — Stn 39, 560 m : 9 ♂ 9.4 to 12.0 mm ; 6 ♀ 9.7 to 11.0 mm (MNHN-Ga 2570 and USNM). — Stn 55, 260 m : 8 ♂ 10.3 to 14.5 mm; 3 ♀ 10.6 to 11.0 mm (MNHN-Ga 3266).

Matthew and Hunter Islands. VOLSMAR : stn 5, 700 m : 2 ♂ 9.4 and 10.5 mm (MNHN-Ga 2571). — Stn 51, 450 m : 1 ♂ 7.2 mm; 2 ov. ♀ 5.4 and 7.1 mm; 1 ♀ 3.4 mm (MNHN-Ga 2572).

TYPES. — The male of 13.0 mm from CHALCAL 2, Stn 1 (MNHN-Ga 2558) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Latin, *armilla*, bracelet, in reference to the colour pattern. The name is considered as a substantive in apposition.

Source : MNHN, Paris

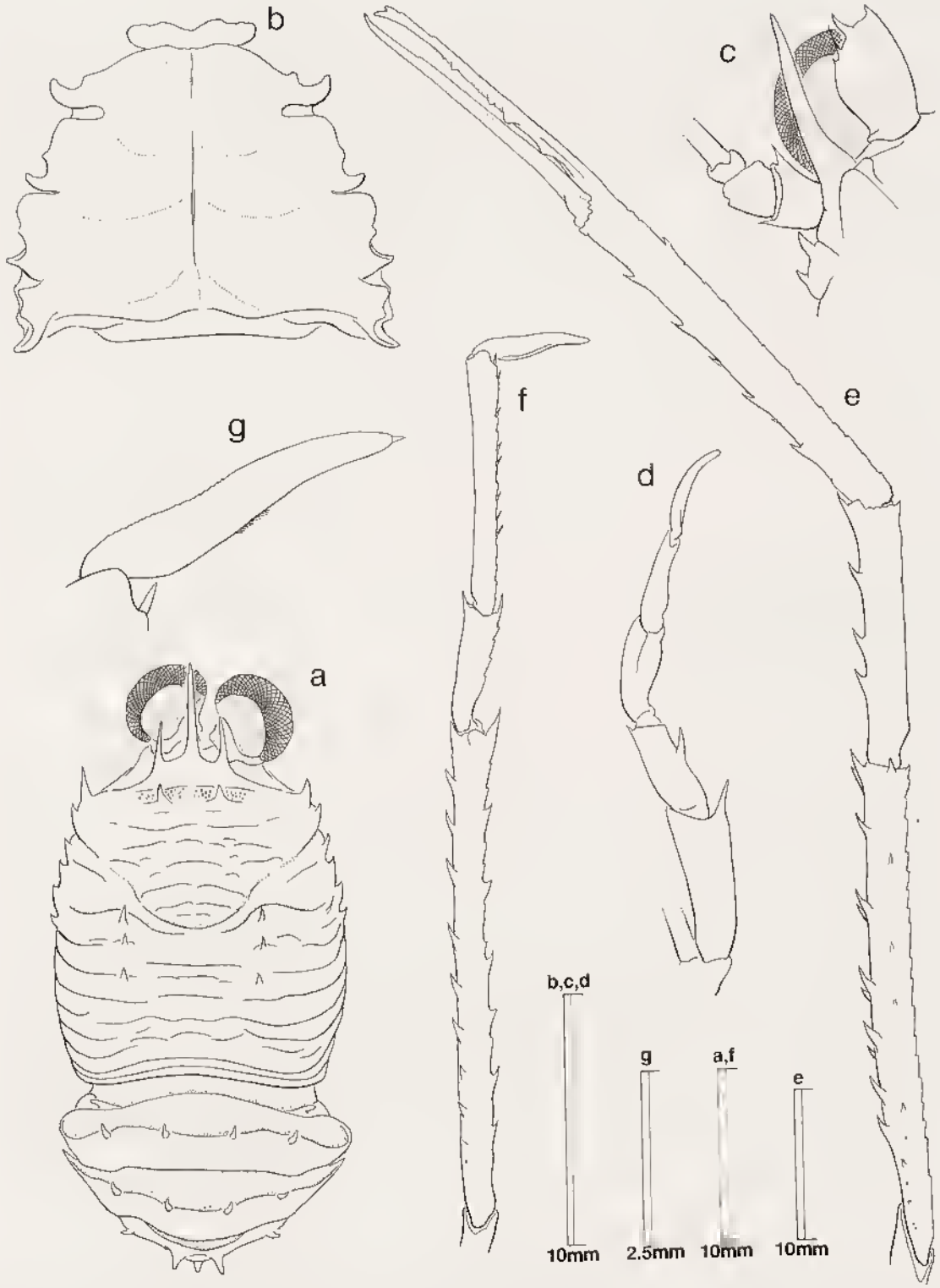

FIG. 5. — *Munida andrewi* sp. nov., ♂ 14.4 mm, holotype from Stn 386 (MUSORSTOM 5) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

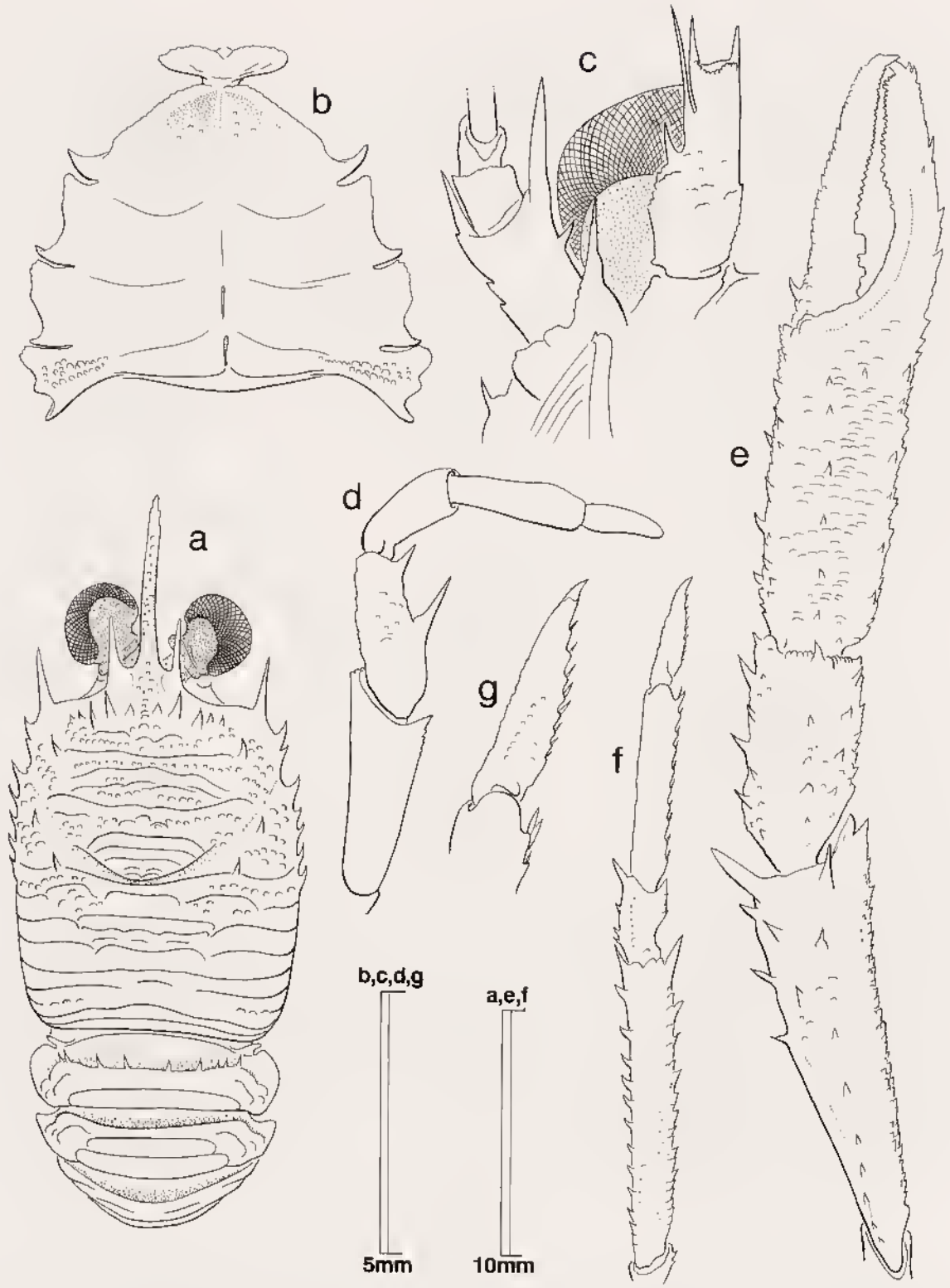

FIG. 6. — *Munida armilla* sp. nov., ♂ 13.0 mm, holotype from Stn 1 (CHALCAL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

DESCRIPTION. — Carapace with numerous scales on gastric and anterior branchial regions. Intestinal region with one scale. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with a few short arcuate striae; fifth to seventh sternites without striae; lateral parts of seventh sternite with coarse granules. Second abdominal tergite with a row of 7-10 spines on anterior ridge. Second and third abdominal segments each with 1-2 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, distomesial spine slightly shorter than distolateral. First segment of antennal peduncle with distomesial spine reaching end of second segment; distomesial spine on second segment exceeding antennal peduncle. Extensor margin of merus of third maxilliped unarmed. Movable finger of cheliped with one basal spine; fixed finger with a row of spines along lateral border. Dactylus of walking legs half as long as propodus, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments orange, striae and spines reddish. Rostrum and supraocular spines reddish. Chelipeds and walking legs orange. Dactylus of walking legs whitish.

REMARKS. — *M. armilla* is close to *M. distiza* sp. nov. from the Philippines, New Caledonia, Loyalty Islands, Matthew and Hunter Islands. The two species can be readily distinguished by constant characters (see below under the Remarks of *M. distiza*).

M. armilla is also related to *M. armata* Baba, from the Philippines (BABA, 1988). A comparison with specimens of the later species (see MACPHERSON, 1993, for the material of *M. armata* examined) showed that they can be differentiated by several aspects :

— The third abdominal segment usually has several spines in *M. armata*, unarmed in *M. armilla*.

— The dactylus of the walking legs is unarmed on the terminal third of the ventral border in *M. armata*, with spines along this margin in *M. armilla*.

SIZE. — The males examined ranged between 4.6 and 14.7 mm, females between 3.2 and 15.8 mm; ovigerous females from 5.4 mm.

DISTRIBUTION. — New Caledonia, Matthew and Hunter Islands, between 233 and 700 m.

Munida barangei sp. nov.

Fig. 7

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 222, 410-440 m : 1 ♂ 5.6 mm (MNHN-Ga 2573). — Stn 240, 475-500 m : 1 ♂ 6.5 mm (MNHN-Ga 2574).
CHALCAL 2 : stn 25, 425 m : 2 ♂ 6.6 and 7.4 mm (MNHN-Ga 2575, 2576).
SMIB 2 : stn 10, 490-495 m : 1 ♂ 7.2 mm (USNM).
SMIB 3 : stn 12, 470 m : 3 ♂ 6.6 and 7.2 mm (MNHN-Ga 2577 and USNM).

TYPES. — The male of 7.4 mm from CHALCAL 2, Stn 25 (MNHN-Ga 2575) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to M. BARANGE of the Instituto de Ciencias del Mar, Barcelona, for his friendship and support in my work.

DESCRIPTION. — Carapace with secondary striae between main striae. Intestinal region without scales. Rostrum very long, nearly as long as remaining carapace. External orbital spine very short, mesial to level of lateral margin. Branchial margin with 5 small spines, fifth spine sometimes undiscernible. Thoracic sternites smooth, without striae. Second abdominal segment unarmed. Second to fifth segments each with 3-4 transverse continuous striae. Males with gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of

Source : MNHN, Paris

antennule (distal spines excluded) reaching end of cornea, distolateral spine longer than distomesial. First segment of antennal peduncle with distomesial spine reaching end of second segment; distomesial spine on second segment slightly exceeding third segment. Extensor margin of merus of third maxilliped unarmed. Fingers of cheliped unarmed; in large specimens 2 distal spines on fixed finger; small specimens with small spines along lateral and mesial borders of fixed and movable fingers, respectively. Dactylus of walking legs half as long as propodus with movable spinules along ventral margin, distal third unarmed.

REMARKS. — *M. barangei* is closely related to *M. alonsoi* sp. nov. from New Caledonia and Chesterfield Islands. They differ in the following aspects :

— The rostrum is as long as the remaining carapace in *M. barangei*, about 1/2 in *M. alonsoi*.

— The external orbital spine in *M. barangei* is more distinctly reduced in size and more mesial to the level of the lateral margin of the carapace than in *M. alonsoi*.

— The second and third abdominal segments have 3-4 striae in *M. barangei*, one in *M. alonsoi*.

— The maximum corneal diameter is about 1/2 the distance between the external orbital spines in *M. barangei*, being about 1/3 in *M. alonsoi*.

— The distomesial spine on the second antennal segment not exceeds the third antennal segment in *M. alonsoi*, whereas it exceeds this segment in *M. barangei*.

—The extensor margin of the merus of the third maxilliped is unarmed in *M. barangei*; with a small distal spine in *M. alonsoi*.

— The dactylus of the walking legs with spines along the entire ventral margin in *M. alonsoi*, whereas the terminal third is unarmed in *M. barangei*.

SIZE. — The males examined ranged between 5.6 and 7.4 mm, no females were caught.

DISTRIBUTION. — New Caledonia, between 410 and 500 m.

Munida bellior Miyake & Baba, 1967

Fig. 66

Munida bellior Miyake & Baba, 1967b : 216, figs 3, 4. — BABA, 1988 : 82 (key), 90.

MATERIAL EXAMINED. — **Loyalty Islands**. MUSORSTOM 6 : stn 419, 285 m : 1 ov. ♀ 12.3 mm (MNHN-Ga 2578).

Chesterfield Islands. CHALCAL 1 : stn 2, 80-120 m : 1 ♂ 5.2 mm (MNHN Ga-3502).
MUSORSTOM 5 : stn 315, 330 m : 1 ♂ broken (MNHN-Ga 2579).

REMARKS. — According to MIYAKE and BABA (1967b) the colouration in preservative (formalin) is : the anterior portion of the carapace is coloured reddish brown, one broad V-shaped reddish-brown band on the posterior half of the carapace; the abdomen is reddish brown; the chelipeds and walking legs have reddish brown bands.

The colour pattern of the specimens examined did not conform to the description of MIYAKE & BABA. The specimens displayed red and white bands on the carapace, abdomen, chelipeds and walking legs. This colour pattern is closer to that of *M. elegantissima* (see BABA, 1969b) than to that of *M. bellior*. However, the morphological characters of the specimens agree quite well with the description and illustrations of *M. bellior* (see also Remarks of *M. elegantissima*). These discrepancies suggest the need for the revision of the material on these two species from the different localities in order to clarify the differences and variations in these two interesting species.

DISTRIBUTION. — Sagami Bay and Philippines, 80-209 m. Loyalty Islands and Chesterfield Islands, 80-330 m.

Munida brachytes sp. nov.

Fig. 8

MATERIAL EXAMINED. — **New Caledonia**. SMIB 5 : stn 86, 320 m : 1 ♂ 3.7 mm, holotype (MNHN-Ga 2580).

Source : MNHN, Paris

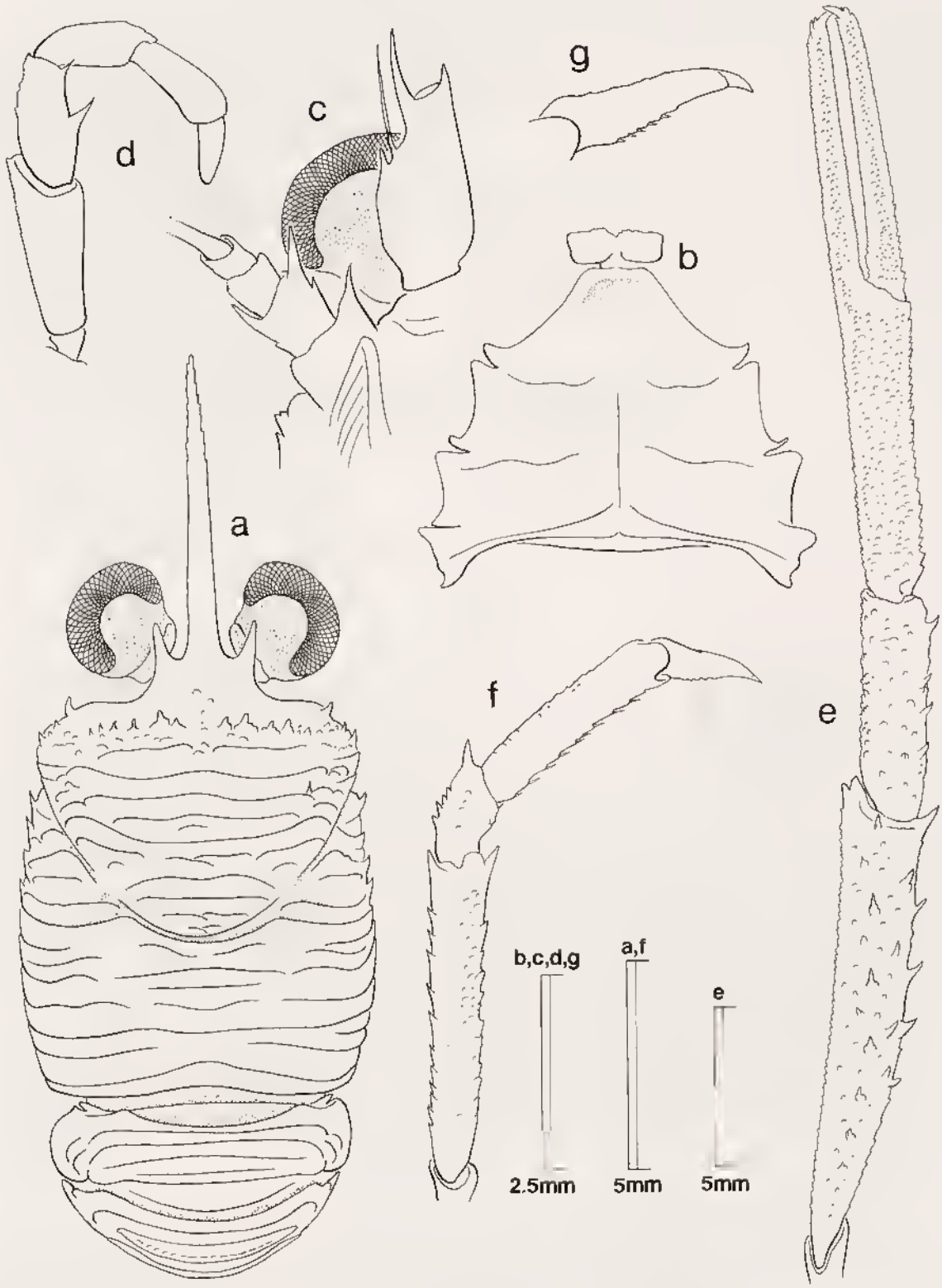

FIG. 7. — *Munida barangei* sp. nov., ♂ 7.4 mm, holotype from Stn 25 (CHALCAL 2) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, right third maxilliped, lateral view; e, left cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

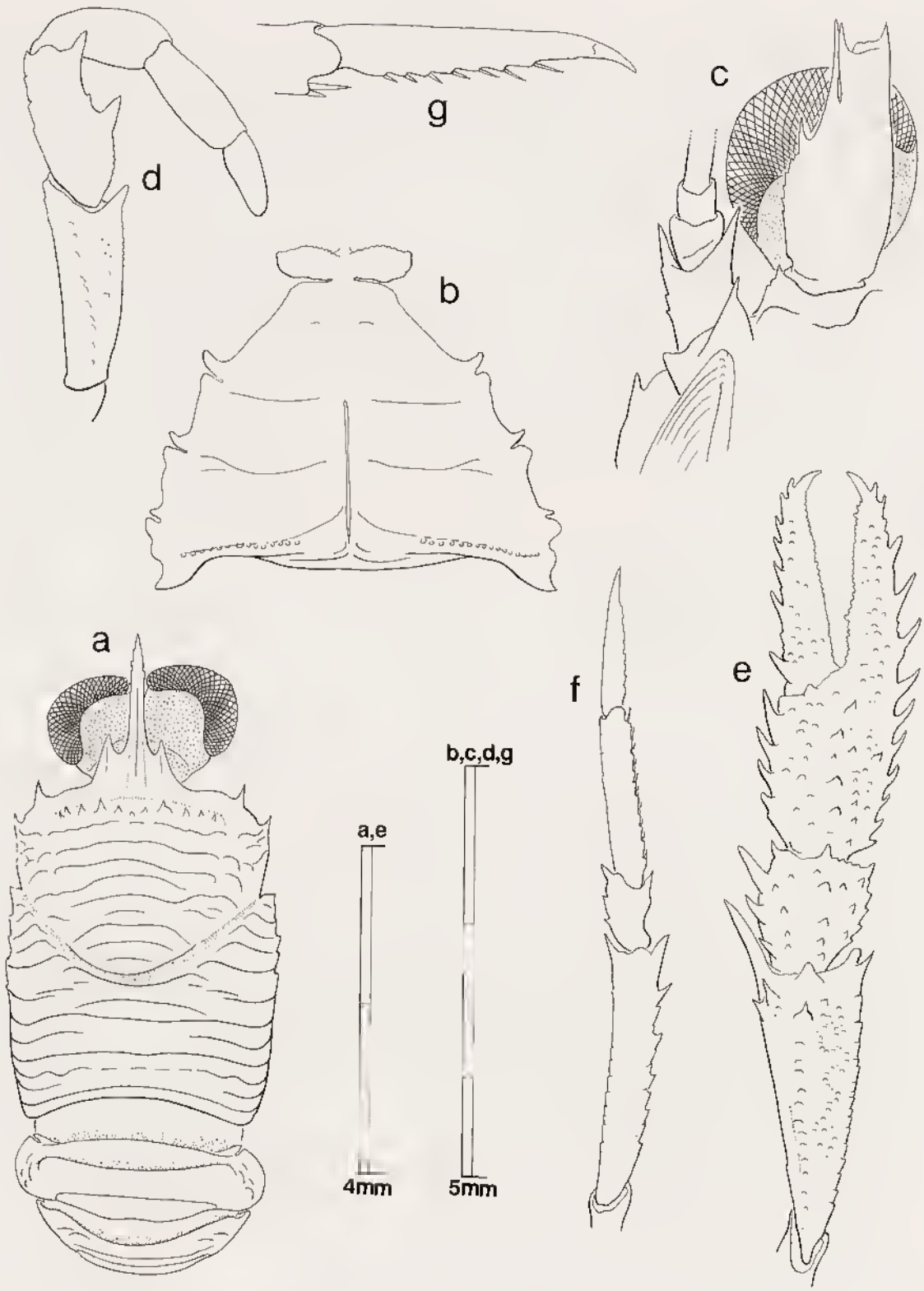

FIG 8. — *Munida brachytes* sp. nov., ♂ 3.7 mm, holotype from Stn 86 (SMIB 5) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

ETYMOLOGY. — From the Greek, *brachytes*, smallness. The name is considered as a substantive in apposition.

DESCRIPTION . — Carapace with few secondary striae. Intestinal region with small scales. External orbital spine short, situated on frontal margin near anterolateral angle of carapace. Branchial margin with 5 small spines. Fourth thoracic sternite with few striae; fifth to seventh without striae. Abdominal segments unarmed. Second and third segments each with one transverse stria. Two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) ending at same level of cornea, with 2 subequal distal spines. First segment of antennal peduncle with short distomesial spine distinctly not reaching end of second segment; distomesial spine on second segment slightly exceeding third segment. Extensor margin of merus of third maxilliped unarmed. Cheliped with a row of well developed spines along mesial and lateral borders of movable and fixed finger, respectively. Dactylus of walking legs slightly shorter than propodus, with movable spinules along ventral margin.

REMARKS. — The closest species of *M. brachytes* is *M. pusiola* Macpherson, 1993, from the Philippines (MACPHERSON, 1993). Both species are easily distinguishable by several aspects :

— The frontal margins are oblique in *M. pusiola*, transverse in *M. brachytes*.

— The merus of the third maxilliped has one well developed distal spine on extensor border in *M. pusiola*, unarmed in *M. brachytes*.

DISTRIBUTION. — New Caledonia, 320 m.

Munida callirrhoe sp. nov.

Figs 9, 91

MATERIAL EXAMINED. — **New Caledonia**. "*Vauban*" : stn 3, 390 m : 8 ♂ 12.0 to 16.4 mm; 9 ov. ♀ 11.3 to 13.6 mm; 1 ♀ 12.4 mm (MNHN-Ga 2826). — Stn 4, 400 m : 16 ♂ 9.7 to 17.5 mm; 12 ov. ♀ 11.0 to 13.2 mm; 2 ♀ 11.8 and 13.3 mm (MNHN-Ga 2827). — Stn CB 34, 400 m : 2 ov. ♀ 13.0 and 13.7 mm (MNHN-Ga 2828).

BIOCAL : stn 42, 380 m : 8 ♂ 8.0 to 14.8 mm; 5 ov. ♀ 11.4 to 12.6 mm; 5 ♀ 7.0 to 10.4 mm (MNHN-Ga 2829). — Stn 78, 445-450 m : 1 ♂ 13.1 mm (MNHN-Ga 2832). — Stn 105, 330-335 m : 4 ♂ 8.4 to 12.2 mm; 5 ov. ♀ 10.1 to 12.2 mm (MNHN-Ga 2833). — Stn 108, 335 m : 8 ov. ♀ 9.3 to 10.8 mm (MNHN-Ga 2581, 2582).

MUSORSTOM 4 : stn 170, 480 m : 1 ♂ 13.3 mm (MNHN-Ga 2835). — Stn 179, 475 m : 4 ♂ 11.5 to 14.0 mm (MNHN-Ga 2836). — Stn 180, 440 m : 8 ♂ 8.7 to 13.4 mm; 1 ♀ 10.0 mm (MNHN-Ga 2837). — Stn 195, 465 m : 8 ♂ 5.3 to 13.7 mm; 8 ov. ♀ 10.4 to 13.6 mm; 6 ♀ 7.2 to 9.5 mm (MNHN-Ga 2838). — Stn 235, 405-415 m : 1 ♀ 7.8 mm (MNHN Ga 2583). — Stn 246, 410-420 m : 1 ♂ 9.5 mm; 1 ov. ♀ 14.8 mm (USNM). — Stn 245, 415-435 m : 6 ♂ 10.0 to 16.5 mm; 4 ov. ♀ 12.7 to 15.3 mm; 2 ♀ 9.7 and 13.2 mm (MNHN-Ga 2839). — Stn 247, 435-460 m : 4 ♂ 9.5 to 13.5 mm; 2 ov. ♀ 12.6 and 13.3 mm (MNHN-Ga 2840). — Stn 248, 380-385 m : 1 ♂ 10.4 mm; 2 ov. ♀ 12.1 and 12.2 mm; 1 ♀ 9.5 mm (MNHN-Ga 2841).

Loyalty Islands. MUSORSTOM 6 : stn 408, 380 m : 1 ♂ 11.6 mm; 2 ♀ 9.6 and 13.0 mm (MNHN-Ga 2848). — Stn 411, 424 m : 1 ♂ 11.0 mm; 1 ov. ♀ 11.5 mm; 2 juv. 3.8 and 4.5 mm (MNHN-Ga 2849). — Stn 412, 437 m : 17 ♂ 10.3 to 15.7 mm; 10 ov. ♀ 11.8 to 14.3 mm; 2 ♀ 9.6 and 10.8 mm (MNHN-Ga 2585). — Stn 415, 461 m : 2 ♂ 11.2 and 15.0 mm; 2 ♀ 15.9 and 16.0 mm (MNHN-Ga 2586). — Stn 460, 420 m : 1 ♀ 13.8 mm (MNHN-Ga 2587). — Stn 464, 430 m : 28 ♂ 9.4 to 16.9 mm; 13 ov. ♀ 11.0 to 14.0 mm; 14 ♀ 8.0 to 13.2 mm (MNHN-Ga 2588). — Stn 465, 480 m : 13 ♂ 10.1 to 15.5 mm; 12 ov. ♀ 11.3 to 16.0 mm; 7 ♀ 10.0 to 14.0 mm (MNHN-Ga 2851). — Stn 467, 575 m : 3 ♂ 14.5 to 15.5 mm; 4 ov. ♀ 13.3 to 15.8 mm (MNHN-Ga 2852).

Chesterfield Islands. CORAIL 2 : stn 16, 500 m : 3 ♀ 7.4 to 8.6 mm (MNHN-Ga 2846). — Stn 17, 500 m : 1 ♂ 9.0 mm (MNHN-Ga 2847).

TYPES. — One ovigerous female (10.0 mm) from BIOCAL, Stn 108 (MNHN-Ga 2581) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Oceanids of the Greek mythology (Callirrhoë).

DESCRIPTION. — Carapace with numerous secondary striae between principal striae, with two epigastric spines directly behind supraoculars, each accompanied behind by smaller protogastric spine (absent in several specimens).

Source : MNHN, Paris

Four spines in a row on dorsal midline ; first anterior mesogastric, second directly behind cervical groove, third on cardiac transverse ridge, fourth on posterior ridge. Two-five more spines on each branchiocardiac boundary. External orbital spine pronounced, situated at anterolateral angle of carapace. Branchial margin with 2-4 spines. Thoracic sternites with numerous arcuate striae. Second, third and fourth abdominal segments each with 4 equal-sized spines on anterior transverse ridge; posterior ridge of fourth segment with median spine. Males with one pair of gonopods. Eye moderately large, maximum corneal diameter more than 1/3 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment (distal spines excluded) exceeding cornea, distolateral spine shorter than distomesial. Distomesial prolongation of first antennal segment well developed, nearly reaching rostral tip; second segment with one distomesial spine reaching end of antennal peduncle, with small spine on its base (not illustrated on Fig. 9); third segment unarmed. Merus of third maxilliped with one spine on flexor margin; one small distal spine on extensor border. Fixed finger of cheliped bifid distally, movable finger with small spine near tip (not illustrated on Fig. 9). Dactylus of walking legs weakly curved, half as long as propodus, without spinules on ventral border.

COLOUR. — Ground colour of carapace and abdomen orange, yellow spots on epigastric and metagastric regions, center of cardiac region and center of second and third abdominal segments. Chelipeds and walking legs with transverse whitish and red bands; fingers of chelipeds reddish; dactylus of walking legs whitish.

REMARKS. — *M. callirrhoe* is closely related to *M. marini* sp. nov. from New Caledonia, Loyalty Islands and Chesterfield Islands but both species differ in several respects (see the Remarks under that species).

SIZE. — The males examined ranged between 5.3 and 17.5 mm, females between 7.0 and 16.0 mm; ovigerous females from 9.3 mm.

DISTRIBUTION. — New Caledonia, Chesterfield Islands and Loyalty Islands, from 335 to 575 m.

Munida callista sp. nov.

Figs 10, 67

MATERIAL EXAMINED. — **New Caledonia.** "*Vauban*" : stn CB 37, 03.03.1977, 400 m : 2 ♂ 14.2 and 15.1 mm; 1 ♀ 15.0 mm (MNHN Ga 2942).

BIOCAL : stn 67, 500-510 m : 2 ♂ 7.9 and 10.0 mm; 1 ♀ 4.4 mm (MNHN-Ga 2938). — Stn 78, 445-450 m : 1 ♂ 18.1 mm; 1 ov. ♀ 17.6 mm (MNHN-Ga 2939, 2940). — Stn 82, 440-460 m : 1 ♂ 18.5 mm (MNHN-Ga 2941).

BIOGEOCAL : stn 308, 510-590 m : 1 ♀ 14.8 mm (MNHN- Ga 3268).

BATHUS 3 : stn 814, 23°48'S, 168°17'E, 444-530 m, 28.11.1993 : 1 ♂ 11,7 mm (MNHN-Ga 3556).

Chesterfield Islands. MUSORSTOM 5 : stn 300, 450 m : 1 ♀ 8.5 mm (MNHN-Ga 2943).

TYPES. — The male of 18.1 mm, from BIOCAL, Stn 78 (MNHN-Ga 2940) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *kallistos*, most beautifull, in reference of the nice coloration of the species.

DESCRIPTION. — Carapace with numerous secondary striae. Hepatic, anterior branchial and intestinal regions squamate. Posteriormost major stria medially interrupted. External orbital spine well developed, situated on frontal border near anterolateral angle of carapace and exceeding sinus between rostrum and supraocular spines. Branchial margin with 3 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh sternites smooth. Abdominal segments unarmed. Two pairs of gonopods present on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, with 2 subequal distal spines. Distomesial spine on first segment of antennal peduncle short, distinctly not reaching end of second segment; distomesial spine on second segment reaching end of antennal peduncle. Extensor margin of merus of third maxilliped unarmed. Fixed and movable fingers of cheliped with a row of spines along lateral and mesial margin, respectively. Dactylus of walking legs about 1/2 propodus length, with movable spinules along entire ventral margin.

Source : MNHN, Paris

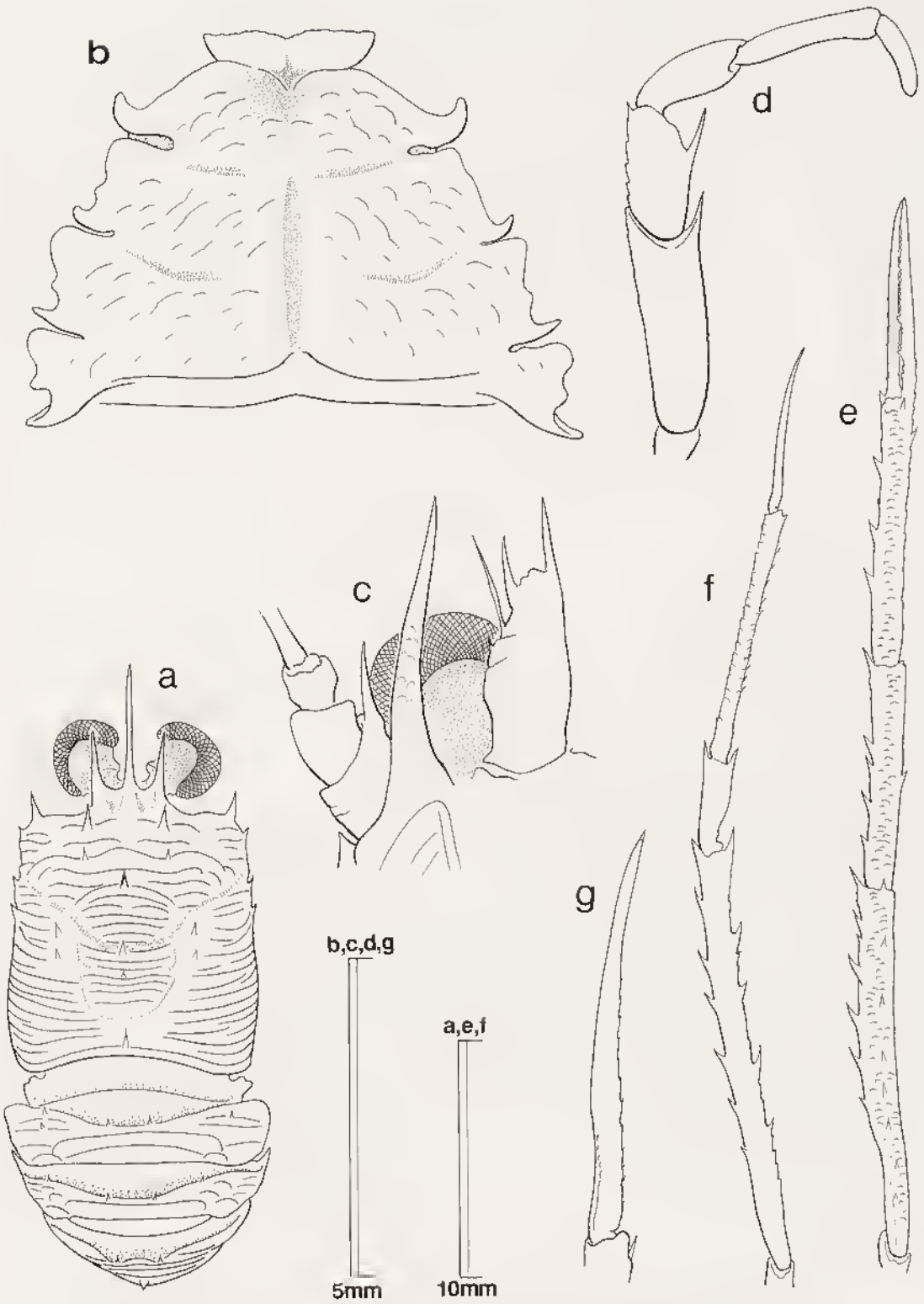

FIG. 9. — *Munida callirrhoe* sp. nov., ov. ♀ 10.0 mm, holotype from Stn 108 (BIOCAL) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

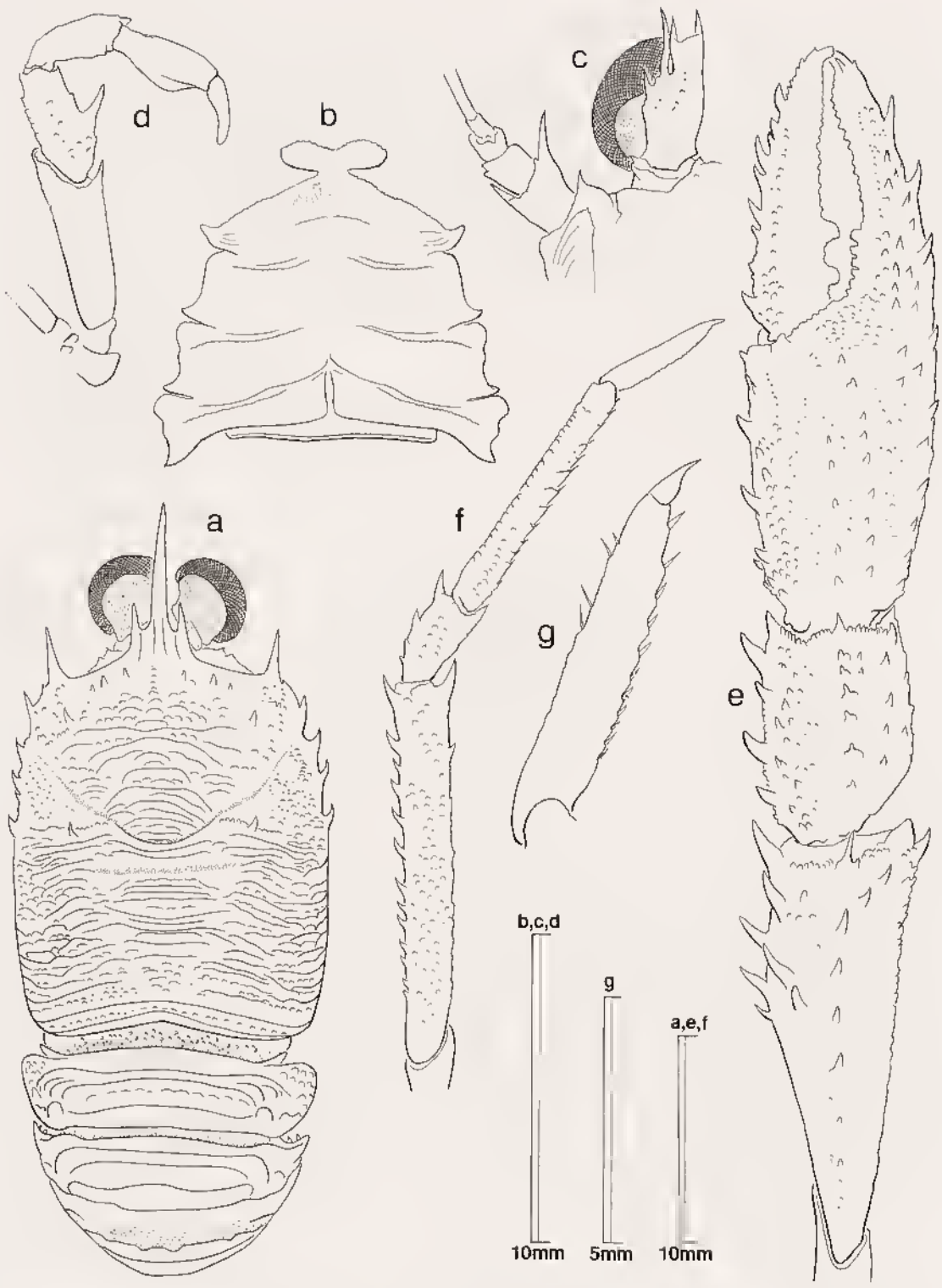

FIG. 10. — *Munida callista* sp. nov., ♂ 18.1 mm, holotype from Stn 78 (BIOCAL) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

COLOUR. — Carapace with wide transverse yellow and purple bands. Epigastric region with a large purple band, followed by a yellow band; a purple band along cervical groove, followed by a yellow band. Second to fourth abdominal segments with a wide yellow band medially, purple laterally. Fingers of chelipeds red, tips whitish. Walking legs whitish.

REMARKS. — *M. callista* is closely related to *M. plexaura* Macpherson & de Saint Laurent, 1991, from French Polynesia. The two species differ in several constant characters (see MACPHERSON & DE SAINT LAURENT, 1991 for the material examined of *M. plexaura*) :

— The dorsal suface of the carapace is distinctly more squamate in the new species. This difference is clearly distinguishable when comparing specimens of similar size of both species.

— The external orbital spine is large in the new species, exceeding the sinus between the rostrum and supraocular spines. In *M. plexaura* this spine is short and does not reach the sinus.

— The fingers of cheliped are mostly red in *M. callista*; whereas in *M. plexaura* only a red spot is present on the movable finger.

SIZE. — The males examined ranged between 7.9 and 18.5 mm, females between 4.4 and 17.6 mm; ovigerous females from 17.6 mm.

DISTRIBUTION. — New Caledonia and Chesterfield Islands, between 400 and 590 m.

Munida clinata sp. nov.

Fig. 11

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 57, 96-107 m : 9 ♂ 3.5 to 8.0 mm; 5 ov. ♀ 3.7 to 7.3 mm (MNHN-Ga 2589).

MUSORSTOM 2 : stn 47, 81-84 m : 1 ov. ♀ 4.3 mm (MNHN-Ga 2590).

MUSORSTOM 3 : stn 117, 92-97 m : 16 ♂ 2.6 to 3.0 mm; 17 ♀ 2.4 to 4.5 mm (USNM). — Stn 121, 73-84 m : 1 ♂ 4.0 mm; 1 ov ♀ 3.6 mm; 1 ♀ 3.2 mm (MNHN-Ga 2591). — Stn 134, 92-95 m : 1 ♂ 8.7 mm; 3 ♀ 7.6 to 8.4 mm (MNHN-Ga 2592 and USNM). — Stn 137, 56 m : 6 ♂ 2.6 to 6.1 mm; 1 ov. ♀ 4.9 mm; 2 ♀ 3.3 and 4.5 mm (MNHN-Ga 2593).

New Caledonia. LAGON : stn 342, 55 m : 1 ♂ 6.8 mm; 1 ov. ♀ 4.7 mm (MNHN-Ga 2594). — Stn 364, 49 m : 1 ♂ 6.7 mm (MNHN-Ga 2595). — Stn 378, 70-72 m : 1 ♂ 6.7 mm (MNHN-Ga 2596). — Stn 391, 65 m : 1 ♂ 8.2 m (MNHN-Ga 2597). — Stn 392, 80 m : 2 ♂ 5.3 and 6.8 mm (MNHN-Ga 2598, 2599). — Stn 583, 44 m : 1 ov. ♀ 6.3 mm (MNHN-Ga 2600). — Stn 836, 57 m : 2 ov. ♀ 5.7 and 6.2 mm (MNHN-Ga 2604). — Stn 837, 28-36 m : 1 ♂ 7.7 mm (MNHN-Ga 2605). — Stn 933, 90-100 m : 1 ♂ 5.1 mm; 1 ov. ♀ 5.9 mm (MNHN-Ga 2606). — Stn 937, 50-55 m : 2 ♂ 7.8 and 8.0 mm (MNHN-Ga 2607). — Stn 1140, 44 m : 2 ♂ 7.2 and 7.5 mm (MNHN-Ga 2615).

MUSORSTOM 4 : stn 150, 110 m : 1 ov. ♀ 7.4 mm (MNHN Ga 2601). — Stn 204, 120 m : 1 ov. ♀ 6.2 mm (MNHN-Ga 2602).

CHALCAL 2 : stn 80, 80-160 m : 4 ♂ 3.9 to 10.6 mm; 3 ov. ♀ 5.0 to 8.6 mm; 2 ♀ 3.9 and 5.7 mm (MNHN-Ga 2603 and USNM).

SMIB 5 : stn 81, 110 m : 1 ♂ 10.0 mm (MNHN-Ga 2610). — Stn 82, 155 m : 1 ov. ♀ 8.9 mm (MNHN-Ga 2611). — Stn 96, 245 m : 1 ♂ 9.5 mm (MNHN Ga 2612). — Stn 99, 58 m : 1 ♂ 6.8 mm; 3 ov. ♀ 6.7 to 7.0 mm (MNHN Ga 2613). — Stn 100, 120 m : 4 ♂ 5.8 to 8.4 mm; 9 ov. ♀ 4.7 to 7.7 mm (MNHN-Ga 2614).

Chesterfield Islands. CHALCAL 1 : stn 2, 80-120 m : 2 ♂ 5.6 and 6.6 mm; 1 ov. ♀ 5.8 mm; 1 ♀ 6.5 mm (MNHN-Ga 2616). — Stn 43, 78 m : 1 ♂ 7.8 mm (MNHN-Ga 2617). — Stn 55, 55 m : 1 ♂ 5.5 mm (MNHN-Ga 2618). — Stn 56, 60 m : 1 ♂ 6.2 mm; 1 ov. ♀ 5.2 mm (MNHN-Ga 2619).

CORAIL 2 : stn 3, 58 m : 1 ov. ♀ 7.3 mm (MNHN-Ga 2608). — Stn 93, 58-60 m : 1 ♂ 6.3 mm; 1 ov. ♀ 6.2 mm (MNHN-Ga 2609).

TYPES. — The male of 6.8 mm, from LAGON, Stn 392 (MNHN-Ga 2598) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Latin, *clinatus*, slope, in reference to the frontal margins of the carapace.

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. Frontal margin distinctly oblique. External orbital spine well developed, situated on frontal border near anterolateral angle of

Source : MNHN, Paris

carapace. Branchial margin with 5 spines. Fourth thoracic sternite with several short arcuate striae; fifth to seventh without striae. Abdominal segments unarmed. Second and third segments each with 2-4 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of

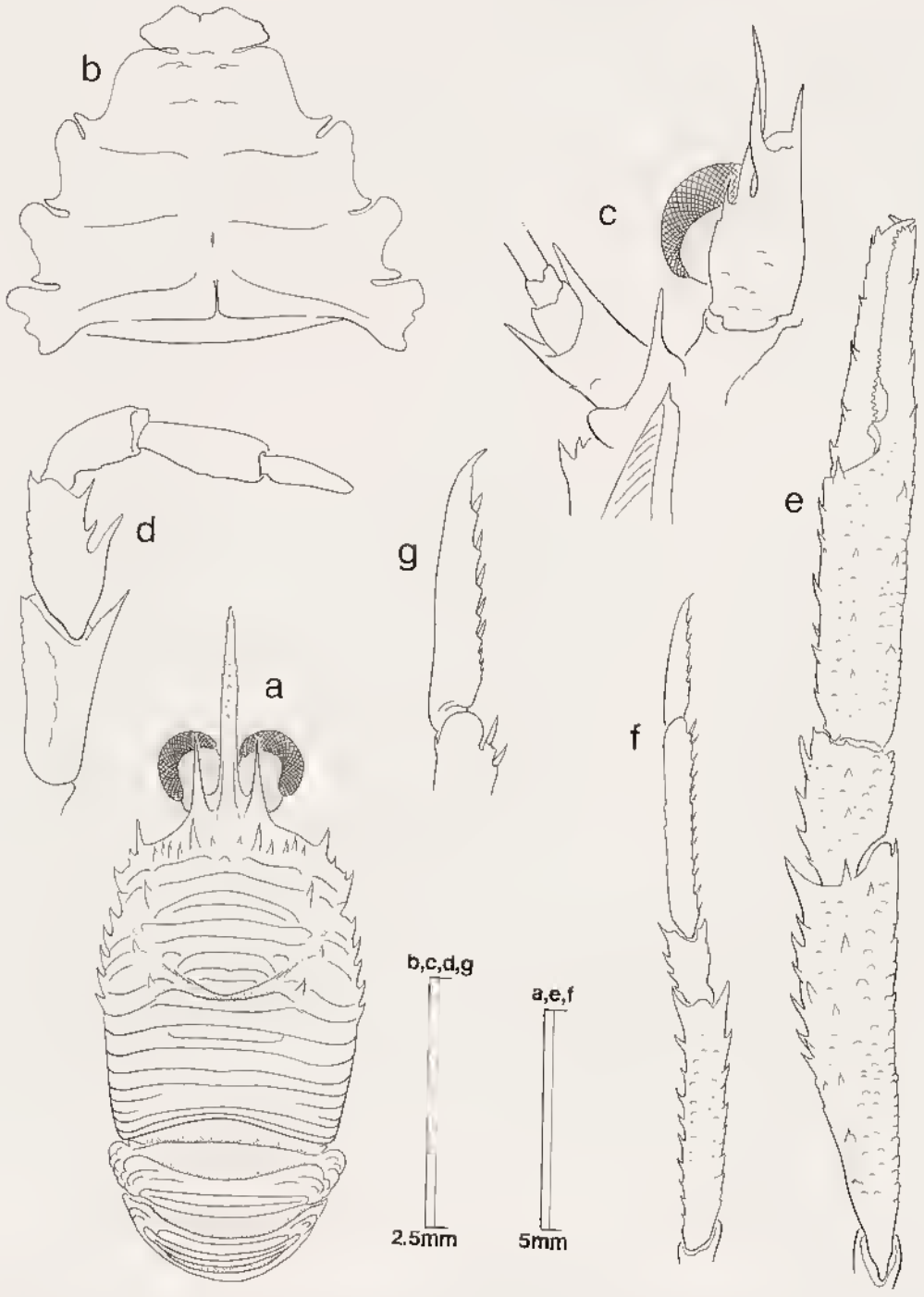

FIG. 11. — *Munida clinata* sp. nov., ♂ 6.8 mm, holotype from Stn 392 (LAGON) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

antennule (distal spines excluded) slightly exceeding cornea, with 2 subequal distal spines. First segment of antennal peduncle with distomesial spine reaching end of second segment; distomesial spine on second segment slightly exceeding antennal peduncle. Extensor border of merus of third maxilliped with distal spine. Fixed and movable fingers of cheliped with a row of spines along lateral and mesial margin, respectively. Dactylus of walking legs 2/3 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. clinata* is closely related to *M. olivarae* sp. nov. from New Caledonia, Loyalty Islands, Matthew and Hunter Islands and *M. roshanei* Tirmizi, 1966, from the Red Sea, Gulf of Aden and Gulf of Oman (TIRMIZI, 1966). The three species are easily differentiable by several characters (see Remarks under *M. olivarae*). The specimens of *M. roshanei* cited by BABA (1988) in the Philippines, probably belong to *M. clinata*.

SIZE. — The males examined ranged between 2.6 and 10.6 mm, females between 2.4 and 8.6 mm; ovigerous females from 3.6 mm.

DISTRIBUTION. — Philippines, New Caledonia and Chesterfield Islands, between 28 and 245 m.

Munida cornuta sp. nov.

Figs 12, 13c

MATERIAL EXAMINED. — **Kiribati**. 600 m, 04.1987 : 1 ♂ 11.7 mm, holotype (MNHN-Ga 2620).

ETYMOLOGY. — From the Latin, *cornus*, horn, in reference to the rostrum.

DESCRIPTION. — Carapace with secondary striae. Intestinal region without scales. External orbital spine short situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh sternites smooth. Second abdominal tergite with a row of 9 spines on anterior ridge. Second and third segments each with 3 transverse striae. Two pairs of gonopods present on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, with 2 subequal distal spines. First segment of antennal peduncle with short distomesial spine reaching end of second segment; distomesial spine on second segment exceeding end of antennal peduncle. Extensor border of merus of third maxilliped unarmed. Cheliped with movable finger unarmed; fixed finger with one subdistal spine. Dactylus of walking legs 3/4 length of propodus, with movable spinules along ventral margin, terminal third unarmed.

REMARKS. — *M. cornuta* is closely related to *M. compressa* Baba from the Philippines (BABA, 1988). These species have the rostrum compressed laterally. However a comparison with specimens from the Philippines (see MACPHERSON, 1993) shows that they differ in the following constant characters:

— The rostrum is shorter and more upwardly directed in *M. cornuta* than in *M. compressa*.

— The carapace and abdominal segments have numerous secondary striae in the new species. In *M. compressa* these striae are scarce and the second abdominal segment has only one transverse stria.

— The terminal third of the dactylus of the walking legs is unarmed in *M. cornuta*, whereas in *M. compressa* the spines are along the entire ventral margin. On the other hand, the dactylus of the walking legs of *M. cornuta* is less curved than in the other species.

M. cornuta is also close to *Munida* sp. from New Caledonia and Loyalty Islands (see below).

DISTRIBUTION. — Kiribati, 600 m.

Munida distiza sp. nov.

Figs 14, 68, 69

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 62, 179-194 m : 1 ♂ 16.6 mm (MNHN-Ga 2621). — Stn 63, 191-195 m : 1 ♂ 13.7 mm (MNHN-Ga 2622).

Source : MNHN, Paris

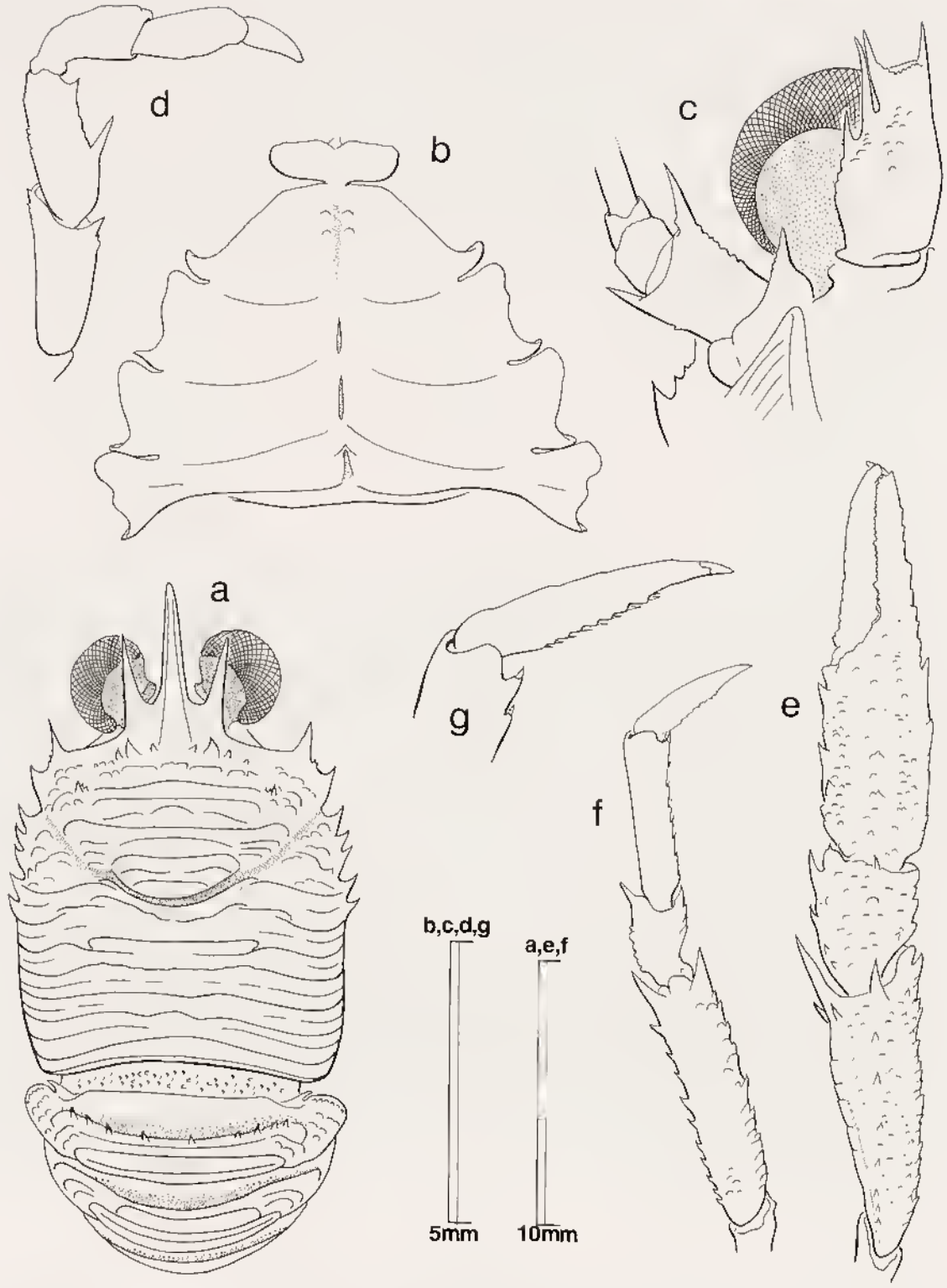

FIG. 12. — *Munida*[s] *cornuta* sp. nov., ♂ 11.7 mm, holotype from Kiribati : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

MUSORSTOM 2 : stn 17, 174-193 m : 1 ov. ♀ 16.0 mm (MNHN Ga 2623). — Stn 51, 170-187 m : 1 ♂ 11.9 mm; 2 ♀ 11.1 and 11.6 mm (MNHN-Ga 2624).

New Caledonia. BIOCAL : stn 84, 150-210 m : 1 ov. ♀ 10.5 mm (MNHN-Ga 3269).

CHALCAL 2 : stn 19, 271 m : 2 ♂ 9.4 and 13.9 mm; 1 ♀ 9.7 mm (MNHN-Ga 2625, 2626). — Stn 20, 230-300 m : 1 ov. ♀ 13.8 mm (MNHN-Ga 2627).

SMIB 4 : stn 44, 300 m : 1 ♀ 8.4 mm (USNM).

Loyalty Islands. 21.02.1977, 400 m : 1 ♂ 18.7 mm (MNHN-Ga 3270).

MUSORSTOM 6 : stn 419, 283 m : 1 ♂ 8.2 mm (MNHN-Ga 2628). — Stn 480, 380 m : 1 ♀ 10.0 mm (USNM).

Matthew and Hunter Islands. VOLSMAR : stn 7, 400 m : 1 ♂ 11.6 mm (MNHN-Ga 2631).

TYPES. — The male of 13.9 mm from CHALCAL 2, Stn 19 (MNHN-Ga 2625) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *stizo*, stain, in reference to the large red spot on the sternal plastron.

DESCRIPTION. — Carapace with numerous secondary striae. Intestinal with one scale. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth and fifth thoracic sternites with some short arcuate striae; sixth and seventh sternites smooth; lateral parts of seventh sternite with coarse granules. Second abdominal tergite with a row of 4 pairs of spines on anterior ridge. Second and third segments each with 4-5 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) slightly exceeding end of cornea, distomesial spine longer than distolateral. Distomesial spine on first segment of antennal peduncle exceeding second segment; distomesial spine on second segment distinctly exceeding antennal peduncle. Extensor border of merus of third maxilliped unarmed. Movable and fixed fingers of cheliped with a row of spines along mesial and lateral borders, respectively. Dactylus of walking legs about half as long as propodus, with movable spinules along entire ventral margin.

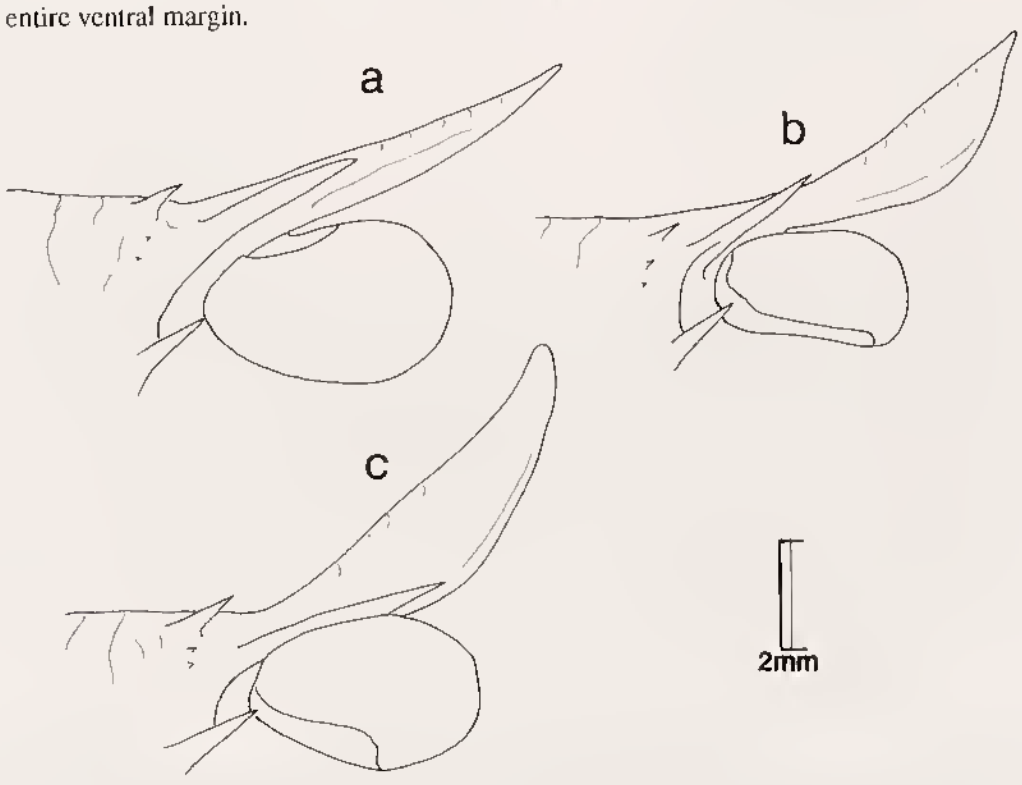

FIG. 13. — Anterior part of carapace, lateral view : a, *Munida rhodonia* sp. nov., ♂ 11.5 mm, holotype from Stn 198 (MUSORSTOM 4); b, *Munida* sp., ♂ 10.5 mm, Stn 239 (MUSORSTOM 4); c, *Munida cornuta* sp. nov., ♂ 11.7 mm, holotype from Kiribati.

Source : MNHN, Paris

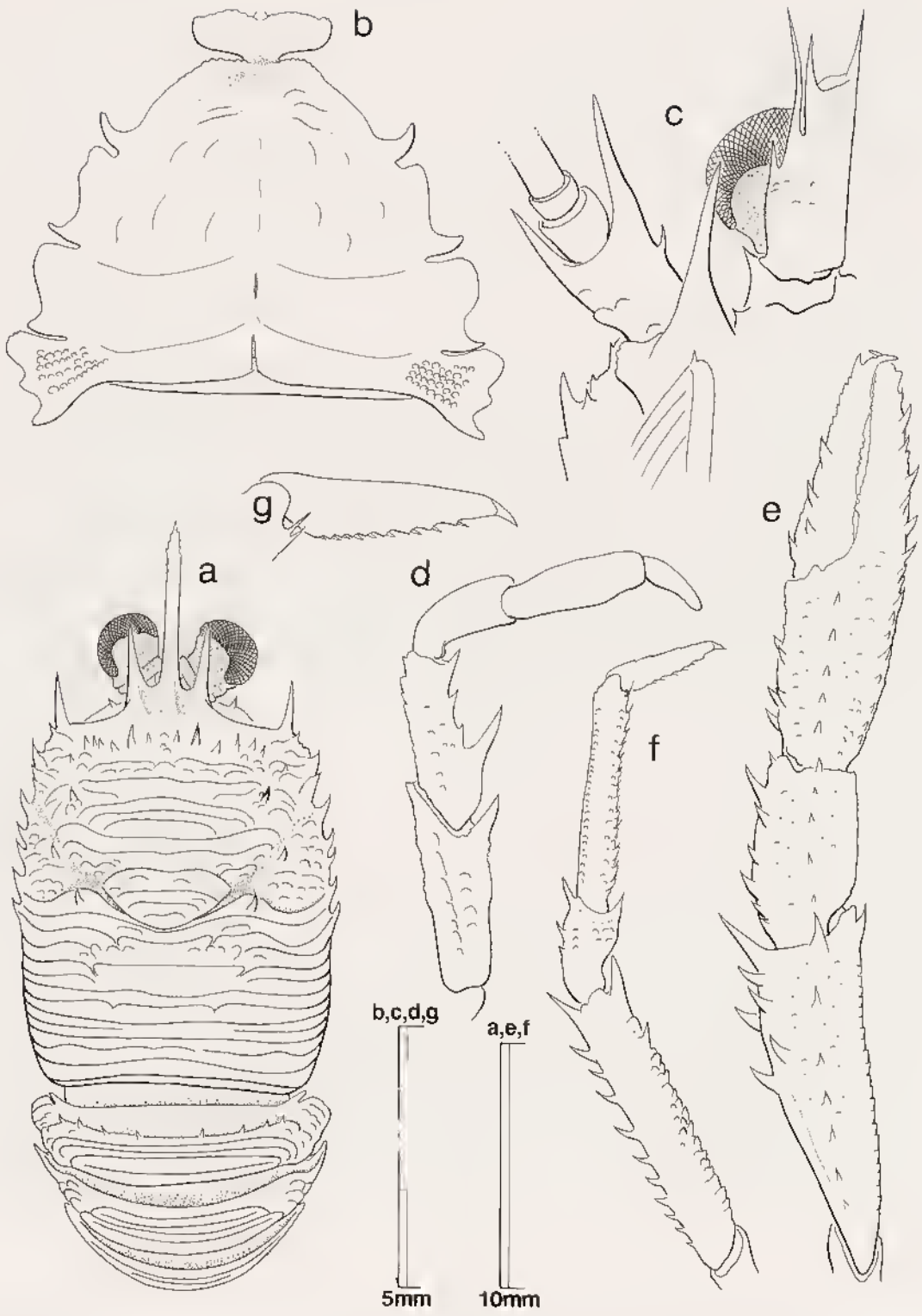

FIG. 14. — *Munida distiza* sp. nov., ♂ 13.9 mm, holotype from Stn 19 (CHALCAL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

COLOUR. — Ground colour of carapace and abdominal segments orange, striae reddish. Rostrum and supraocular spines orange. Chelipeds and walking legs with transverse whitish and orange bands. Merus of cheliped with red spot on distolateral portion. Distal part of chelipeds and dactylus of walking legs whitish. Thoracic sternites red.

REMARKS. — *M. distiza* is closely related to *M. armilla* sp. nov, from New Caledonia, Matthew and Hunter Islands. They differ in the following aspects :

— The second and third abdominal segments have more transverse striae in *M. distiza* than in *M. armilla*.

— The distomesial spine on the basal antennular segment is longer than the distolateral in *M. distiza*, whereas is shorter in *M. armilla*.

— The movable finger of the cheliped in *M. distiza* has one a row of spines along the mesial margin, whereas *M. armilla* has only one spine near its base.

— The colour patterns are different in both species (see Figs 65 and 68, 69).

M. distiza is also close to *M. guttata* sp. nov. from New Caledonia and Loyalty Islands. The two species can be easily distinguished by several constant characters (see below under the Remarks of *M. guttata*).

SIZE. — The males examined ranged between 8.2 and 18.7 mm, females between 8.4 and 16.0 mm; ovigerous females from 10.5 mm.

DISTRIBUTION. — Philippines, New Caledonia, Loyalty Islands, Matthew and Hunter Islands, between 170 and 400 m.

Munida eclepsis sp. nov.

Figs 15, 70

MATERIAL EXAMINED. — **New Caledonia**. SMIB 3 : stn 1, 520 m : 2 ♂ 5.2 and 6.3 mm, paratypes (MNHN-Ga 3271).

SMIB 4 : stn 34, 515 m : 1 ♀ 11.0 mm, holotype (MNHN-Ga 2632).

ETYMOLOGY. — From the Greek, *eclepsis*, surprise, in reference to the unexpected number of new species in the area. The name is considered as a substantive in apposition.

DESCRIPTION. — Carapace with few secondary striae. Intestinal region with one scale. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh sternites smooth. Second abdominal tergite with a row of 4 pairs of spines on anterior ridge. Second and third segments each with 1-2 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, with distomesial spine slightly shorter than distolateral. Distomesial spine on first segment of antennal peduncle reaching end of second segment; distomesial spine on second segment exceeding antennal peduncle. Extensor margin of merus of third maxilliped unarmed. Cheliped with movable finger bearing one mesial spine near its base; fixed finger with a row of spines along lateral border. Dactylus of walking legs half as long as propodus, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments reddish, striae dark red. Rostrum, supraocular spines and external orbital spines dark red. Chelipeds and walking legs with whitish and reddish bands. Proximal half of fingers of chelipeds whitish, tips dark red. Dactylus of walking legs whitish.

REMARKS. — *M. eclepsis* is closely related to *M. militaris* Henderson, 1885, from Fiji and New Caledonia (see below).

DISTRIBUTION. — New Caledonia, 515-520 m.

Source : MNHN, Paris

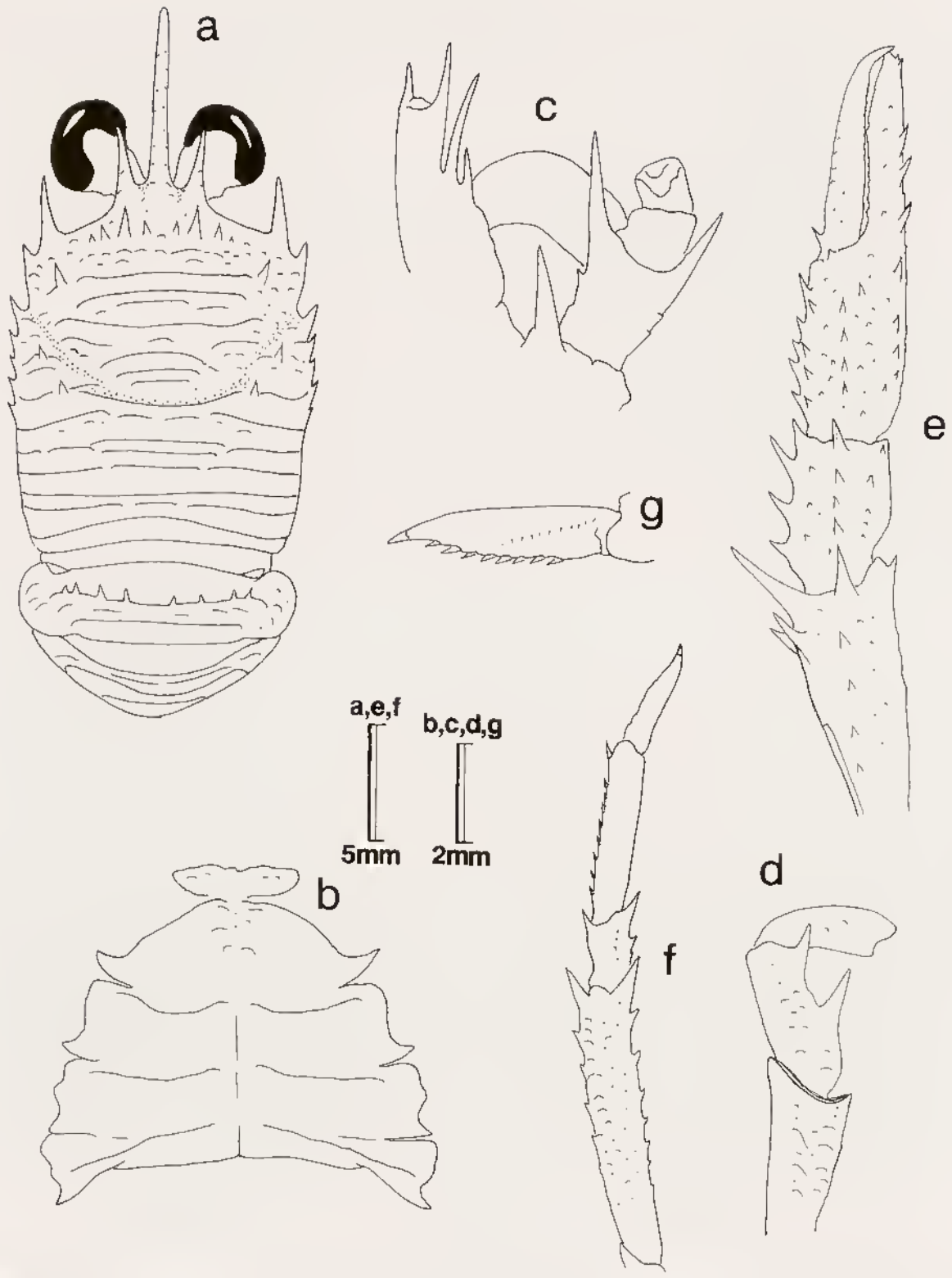

FIG. 15. — *Munida eclepsis* sp. nov., ♀ 11.0 mm, holotype from Stn 34 (SMIB 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, left first walking leg, lateral view; **g**, dactylus of left first walking leg, lateral view.

Source : MNHN, Paris

Munida elachia sp. nov.

Figs 16, 71

MATERIAL EXAMINED. — **New Caledonia.** CHALCAL 2 : stn 73, 573 m : 2 ♂ 4.7 and 6.5 mm; 2 ♀ 4.4 and 5.0 mm (MNHN-Ga 2633, 2634, USNM). — Stn 74, 650 m : 1 ♀ 4.3 mm (MNHN-Ga 2635).

TYPES. — The female of 4.4 mm from CHALCAL 2, Stn 73 (MNHN-Ga 2633) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *elachys*, small.

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. External orbital spine short, situated at anterolateral angle of carapace. Branchial margin with 5 small spines. Thoracic sternites smooth, without striae. Second abdominal tergite with a row of 4 pairs of spines on anterior ridge. Second and third segments each with one transverse stria. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) slightly exceeding end of cornea, with 2 subequal distal spines. Distomesial spine on first segment of antennal peduncle distinctly not reaching end of second segment; distomesial spine on second segment exceeding third segment. Extensor margin of merus of third maxilliped unarmed. Cheliped with movable finger bearing one mesial spine near its base; fixed finger with a row of spines along lateral border. Dactylus of walking legs about 2/3 propodus length, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments orange, anterior half of carapace reddish. Rostrum and supraocular spines red; distal half of rostrum white, tip red. Chelipeds and walking legs with transverse white and orange bands. Fingers of chelipeds and dactylus of walking legs whitish.

REMARKS. — *M. elachia* is closely related to *M. thoe* sp. nov. from New Caledonia, Matthew and Hunter Islands, and *M. semoni* Ortmann, 1894, from Indonesia and New Caledonia (see below for the differences between these species).

SIZE. — The males examined measured 4.7 and 6.5 mm, females ranged between 4.3 and 5.0 mm; no ovigerous females were caught.

DISTRIBUTION. — New Caledonia, between 573 and 650 m.

Munida elegantissima de Man, 1902

Munida elegantissima - BABA, 1988 : 82 (key), 94 (references); 1989 : 131.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 1 : stn 57, 96-107 m : 1 ♂ 4.9 mm; 2 ov. ♀ 7.2 and 7.3 mm; 1 ♀ 2.6 mm (MNHN-Ga 2636). — Stn 62, 179-194 m : 1 ♀ 3.7 mm (MNHN-Ga 2637).

MUSORSTOM 2 : stn 8, 85-90 m : 1 ♂ 8.4 mm; 1 ov. ♀ 9.3 mm (MNHN-Ga 2638). — Stn 47, 81-84 m : 1 ♂ 5.3 mm; 2 ov. ♀ 9.0 and 9.8 mm (USNM).

MUSORSTOM 3 : stn 117, 92-97 m : 1 ♂ 4.5 mm; 1 ♀ 2.9 mm (MNHN-Ga 2640).

New Caledonia. LAGON : stn 640, 50-80 m : 1 ov. ♀ 9.3 mm (MNHN-Ga 2642).

Bellona Islands. CORAIL 1 : without position : 1 ov. ♀ 12.2 mm (MNHN-Ga 2641).

REMARKS. — *Munida elegantissima* de Man, 1902, and *M. bellior* Miyake & Baba, 1967, are the unique among known species of the genus in having epipods on the pereiopods and a distal spine on the flexor border of the carpus of the third maxilliped. *Munida bellior* is characterized by the dorsal surface of the carapace bearing long setae and 4 spinelets on the ventral margin of the propodus of the first walking leg. In *M. elegantissima* the carapace has long setae and the propodus of the first walking leg has 8-9 ventral spines. From the descriptions and illustrations provided by MIYAKE & BABA (1967b) and BABA (1969b), other differences between both species are :

Source : MNHN, Paris

(1) the presence of a distolateral spine on the third segment of the antennal peduncle and (2) a distal spine on the extensor border of the merus of the third maxilliped in *M. elegantissima*, both spines are absent in *M. bellior*.

The specimens collected in the Philippines, Bellona Islands and New Caledonia have the carapace with long setae and the number of ventral spines on the propodus of the first walking legs ranges between 4 and 6. Considering that in all the specimens examined the spinulation of the antennal peduncle and the third maxilliped are constant and agree with the definition of *M. elegantissima*, I consider that these characters are specific and can be used to differentiate both species.

The colour pattern is also different in both species (see Remarks for *M. bellior*).

SIZE. — The males examined ranged between 4.5 and 8.4 mm, females between 2.9 and 12.2 mm; ovigerous females from 7.2 mm.

DISTRIBUTION. — Previously known from Eastern Indian Ocean, Malay Archipelago, Indonesia, Philippines, Japan and Western and Eastern Australia, between 20 and 200 m (BABA, 1988). The specimens examined here were collected in the Philippines, New Caledonia and Bellona Islands, between 50 and 194 m.

Munida eminens Baba, 1988

Fig. 72

Munida eminens Baba, 1988 : 82 (key), 95, fig 35.

MATERIAL EXAMINED. — **Philippines.** MUSORSTOM 3 : stn 116, 804-812 m : 1 ♂ 11.1 mm (MNHN-Ga 2643).
Indonesia. CORINDON 2 : stn 240, 675 m : 2 ♀ 12.3 and 17.1 mm (MNHN-Ga 2644).
New Caledonia. BIOCAL : stn 31, 850 m : 2 ♂ 12.6 mm and 15.0 mm (MNHN-Ga 2645). — Stn 32, 825 m : 1 ♀ 9.3 mm (MNHN-Ga 2646). — Stn 75, 825-860 m : 1 ♂ 7.0 mm; 1 ♀ 4.8 mm (MNHN Ga 2648).
BIOGEOCAL : stn 232, 760-790 m : 1 ♂ 10.0 mm; 1 ov. ♀ 17.8 mm; 1 ♀ 6.0 mm (USNM).
Loyalty Islands. MUSORSTOM 6 : stn 427, 800 m : 1 ♂ 7.4 mm; 1 ov. ♀ 16.4 mm (MNHN-Ga 2651). — Stn 438, 780 m : 5 ♂ 7.8 to 14.7 mm; 2 ov. ♀ 14.4 and 17.3 mm (MNHN-Ga 2652). — Stn 488, 800 m : 1 ♀ 6.0 mm (MNHN-Ga 2653).
Chesterfield Islands. MUSORSTOM 5 : stn 323, 970 m : 4 ♂ 9.3 to 10.0 mm; 2 ♀ 7.4 and 11.7 mm (USNM). — Stn 324, 970 m : 1 ♂ 10.6 mm; 2 ♀ 7.0 and 9.2 mm (MNHN-Ga 2656). — Stn 390, 745-825 m : 8 ♂ 12.0 to 18.1 mm; 11 ♀ 7.4 to 19.4 mm (MNHN-Ga 2657).

COLOUR. — Ground colour of carapace and abdomen orange. Rostrum and spines on carapace and abdomen reddish. Chelipeds and walking legs with red and whilish bands; terminal part of fingers of chelipeds and dactylus of walking legs red.

REMARKS. — The specimens examined agree quite well with the original description and figures provided by BABA (1988). Usually, the specimens examined have 2 branchiocardiac spines on each side (3 in the types) and the second cardiac spine is absent (present in the types).

SIZE. — The males examined ranged between 7.0 and 18.1 mm, females between 4.8 and 19.4 mm; ovigerous females from 14.4 mm.

DISTRIBUTION. — The material examined has been collected in the Philippines, Indonesia, New Caledonia, Loyalty Islands and Chesterfield Islands, between 675 and 970 m. BABA (1988) described the species from specimens captured in the Philippines, between 564 and 686 m.

Munida erato sp. nov.

Fig. 17

MATERIAL EXAMINED. — **New Caledonia.** "*Vauban*" : stn 79, 400 m : 1 ♂ 14.0 mm, holotype (MNHN-Ga 2658).
Chesterfield Islands. MUSORSTOM 5 : stn 354, 420-450 m : 1 ♀ 8.3 mm, paralype (MNHN-Ga 2659).

ETYMOLOGY. — The name refers to one of the Nereids of Greek mythology (Erato).

Source : MNHN, Paris

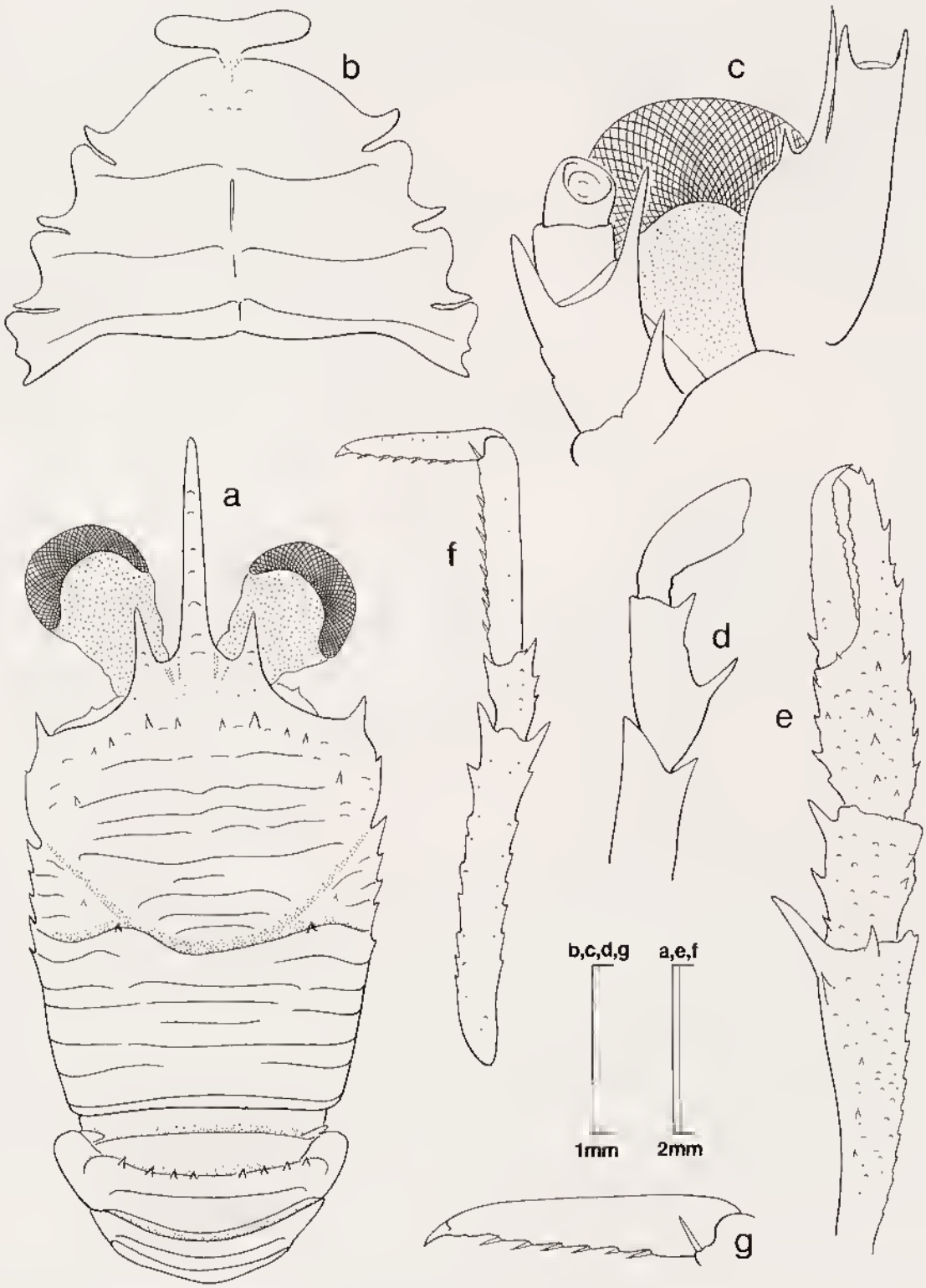

FIG. 16. — *Munida elachia* sp. nov., ♀ 4.4 mm, holotype from Stn 73 (CHALCAL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, left first walking leg, lateral view; **g**, dactylus of left first walking leg, lateral view.

Source : MNHN, Paris

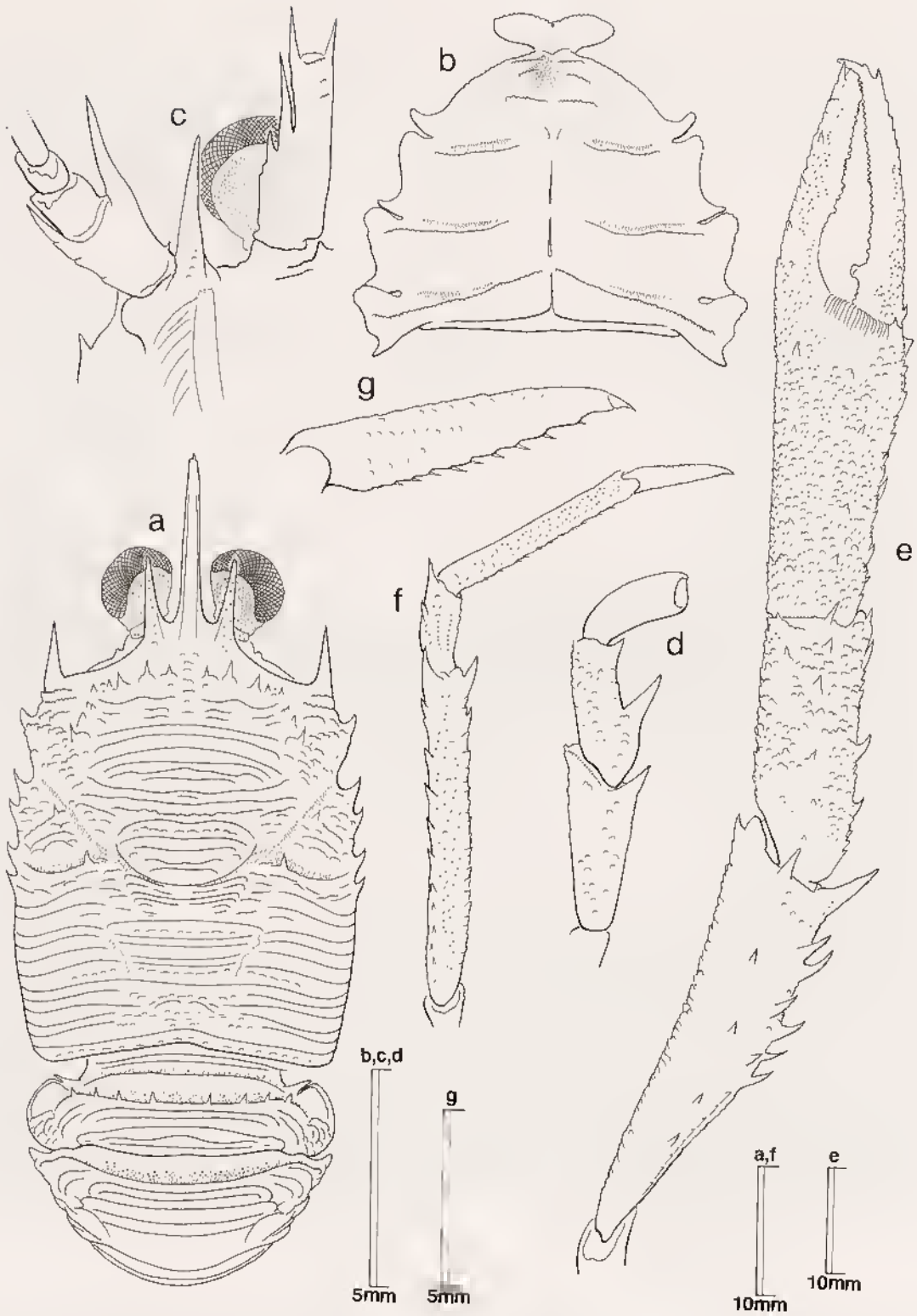

FIG. 17. — *Munida erato* sp. nov., ♂ 14.0 mm, holotype from Stn 79 (*"Vauban"*) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

DESCRIPTION. — Carapace with numerous secondary striae between principal striae. Intestinal region with small scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines quite similar in size. Fourth thoracic sternite with some short arcuate striae; fifth to seventh sternites smooth. Second abdominal segment with 4 pairs of spines on anterior ridge. Second to fourth abdominal segments each with 4-6 continuous striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately small, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) distinctly exceeding cornea, with 2 subequal distal spines. Distomesial spine on first segment of antennal peduncle slightly exceeding second segment; distomesial spine on second segment exceeding antennal peduncle. Extensor margin of merus of third maxilliped unarmed. Fixed finger of cheliped with a row of dorsolateral spines; movable finger with one proximal and one distal spine on mesial border. Dactylus of walking legs 1/2 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. erato* resembles *M. zebra* sp. nov. from New Caledonia and Loyalty Islands. The two species differ in several constant characters (see Remarks under that species).

DISTRIBUTION. — New Caledonia and Chesterfield Islands, 400-450 m.

Munida gordoae sp. nov.

Fig. 18

MATERIAL EXAMINED. — **New Caledonia.** CHALCAL 2 : stn 21, 500 m : 1 ♀ 5.7 mm (MNHN-Ga 3272). — Stn 84, 170 m : 1 ♂ 3.2 mm (MNHN-Ga 2660).

Loyalty Islands. MUSORSTOM 6 : stn 401, 270 m : 1 ♂ 3.8 mm (MNHN-Ga 2662). — Stn 418, 283 m : 1 ♂ 4.9 mm (MNHN-Ga 2663). — Stn 473, 236 m : 1 ♂ 5.6 mm (MNHN-Ga 2664).

Matthew and Hunter Islands. VOLSMAR : stn 48, 200 m : 1 ♂ 5.0 mm; 1 ov. ♀ 4.3 mm; 3 ♀ 3.7 to 5.9 mm (MNHN-Ga 2665).

Chesterfield Islands. CITALCAL 1 : stn 2, 80-120 m : 3 ♂ 3.2 to 4.3 mm; 1 ov. ♀ 5.6 mm; 1 ♀ 3.5 mm (MNHN-Ga 2666). — Stn 3, 100-150 m : 1 ♂ 6.0 mm (USNM). — Stn 30, 150-180 m : 1 ♂ 6.4 mm (MNHN-Ga 2668).

MUSORSTOM 5 : stn 348, 260 m : 3 ♂ 2.4 to 4.0 mm; 1 ov. ♀ 5.9 mm (MNHN-Ga 2669).

CORAIL 2 : stn 141, 95 m : 1 ♂ 6.5 mm (MNHN Ga 2661).

TYPES. — One male of 6.5 mm from CORAIL 2, Stn 141 (MNHN-Ga 2661) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to A. GORDOA from the Instituto de Ciencias del Mar, Barcelona, for his friendship and support in my work.

DESCRIPTION. — Carapace with few secondary striae between principal striae. Intestinal region with one scale. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines. Fourth thoracic sternite with several short arcuate striae; fifth to seventh smooth; lateral parts of seventh sternite with numerous coarse granules. Second abdominal segment with a row of 4 pairs of spines on anterior ridge. Second abdominal segment with 4 pairs of spines on anterior ridge. Second and third abdominal segments each with one transverse stria. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) distinctly exceeding cornea, dislomesial spine shorter than dislolateral. Distomesial spine on first segment of antennal peduncle reaching end of second segment; distomesial spine on second segment exceeding third segment. Extensor border of merus of third maxilliped unarmed. Cheliped with several spines on proximal half of mesial and lateral borders of movable and fixed finger, respectively, two subterminal spines on each finger. Dactylus of walking legs 2/3 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. gordoae* is closely related to *M. leptosyne* sp. nov., from Loyalty Islands and Chesterfield Islands described below (see Remarks under that species).

Source : MNHN, Paris

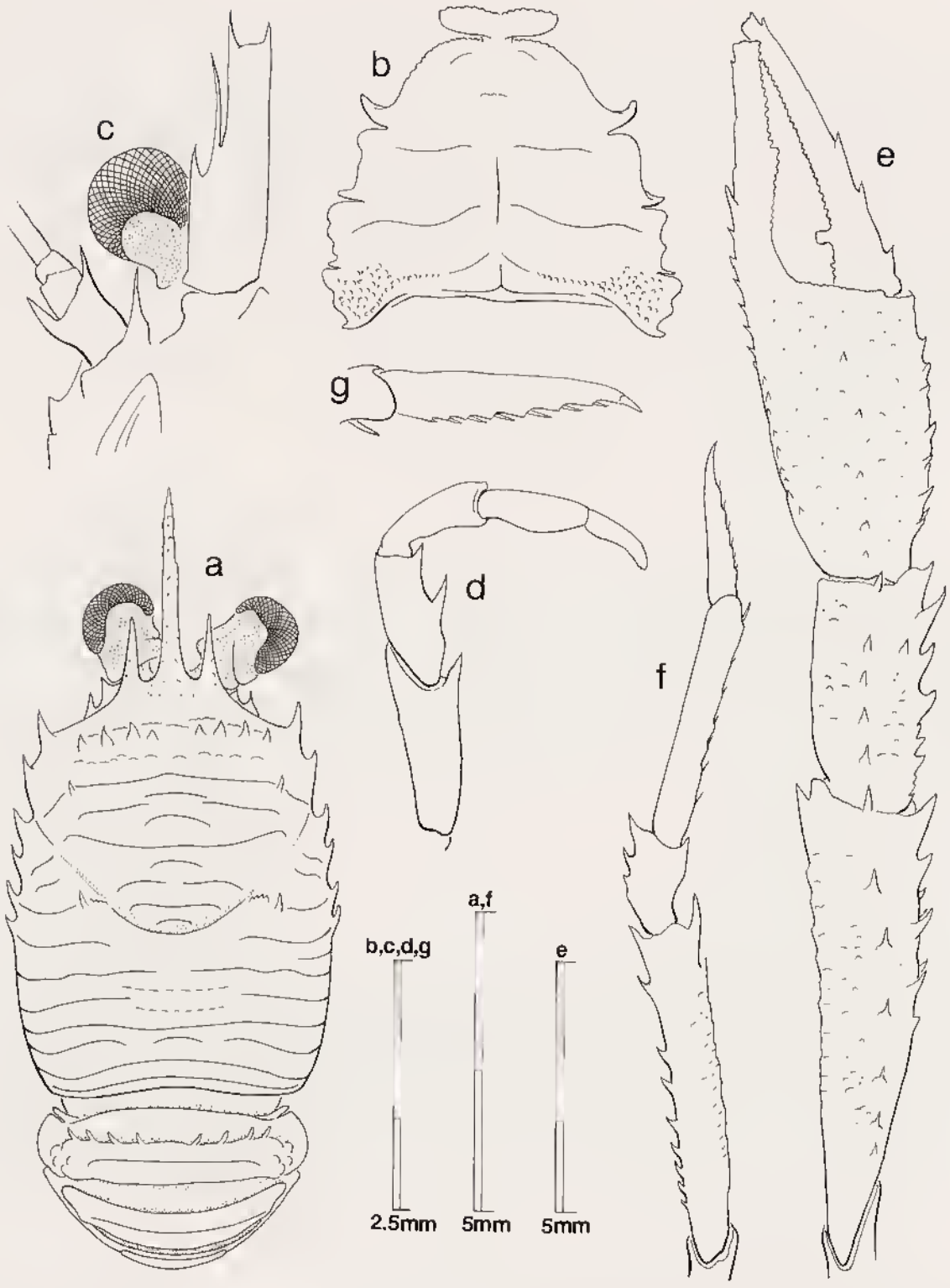

FIG. 18. — *Munida gordoae* sp. nov., ♂ 6.5 mm, holotype from Stn 141 (CORAIL 2) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, right third maxilliped, lateral view; e, left cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

SIZE. — The males examined ranged between 2.4 and 6.5 mm, females between 3.5 and 5.9 mm; ovigerous females from 4.0 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands, Chesterfield and Matthew and Hunter Islands, between 80 and 283 m.

Munida gracilis Henderson, 1885

Fig. 19

Munida gracilis Henderson, 1885 : 412; 1888 : 143, pl. 15, fig. 4.

MATERIAL EXAMINED. — **New Zealand.** *"Challenger"* : stn 166, 23.06.1874, 38°50'S, 169°20'E, 503 m : 1 ♂ 5.5 mm; 1 ♀ 6.8 mm, types (BM).

REMARKS. — This species has been only cited off New Zealand. In order to improve the knowledge of this interesting species, and considering the proximity of the type locality with New Caledonia, a brief diagnosis and an illustration is provided.

DESCRIPTION. — Carapace with few secondary striae, pair of protogastric spines behind largest epigastric spines. Frontal margin oblique. Branchial margin with 5 spines. Fourth thoracic sternite with few short striae, fifth to seventh smooth. Abdominal tergites with 8 spines on second segment, 4 spines on third segment. Second and third segments with 1 and 2 continuous striae, respectively. Eye large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennular peduncle (distal spines excluded) reaching end of cornea; distomesial spine longer than distolateral. Distomesial spine on basal segment of antennal peduncle reaching end of second segment. Distomesial spine on second segment exceeding peduncle. Merus of third maxilliped with extensor margin unarmed. Cheliped with movable finger armed with one basal and one distal spine; fixed finger with one distal spine. Dactylus of walking legs slightly shorter than propodus, terminal third of ventral margin unarmed.

DISTRIBUTION. — New Zealand, 503 m.

Munida guttata sp. nov.

Figs 20, 73

MATERIAL EXAMINED. — **New Caledonia.** 01.09.1978, 200 m : 1 ♂ 15.8 mm; 1 ov. ♀ 13.7 mm (MNHN-Ga 3278).

MUSORSTOM 4 : stn 183, 280 m : 1 ♂ 10.8 mm; 1 ♀ 11.4 mm (MNHN-Ga 2670). — Stn 184, 260 m : 2 ♂ 6.0 and 7.7 mm; 1 ov. ♀ 8.3 mm; 2 ♀ 10.3 and 10.5 mm (MNHN-Ga 3273). — Stn 191, 250 m : 1 ov. ♀ 10.0 mm (MNHN-Ga 2671). — Stn 227, 320 m : 1 ♂ 5.7 mm (MNHN-Ga 2672).

CHALCAL 2 : stn 19, 271 m : 1 ♂ 13.5 mm; 1 ov. ♀ 11.0 mm (MNHN-Ga 2673, 2674). — Stn 78, 233-360 m : 1 ♂ 5.8 mm; 2 ov. ♀ 12.1 and 12.3 mm (USNM). — Stn 79, 243-260 m : 1 ♂ 10.8 mm (MNHN-Ga 2676). — Stn 83, 200 m : 1 ov. ♀ 11.2 mm (MNHN-Ga 3401). — Stn 84, 170 m : 1 ♂ 8.4 mm (MNHN-Ga 2677).

SMIB 3 : stn 14, 246 m : 2 ♀ 5.8 and 8.7 mm (MNHN-Ga 2678).

SMIB 4 : stn 41, 235 m : 1 ov. ♀ 14.5 mm (MNHN-Ga 2680). — Stn 51, 260 m : 1 ov. ♀ 13.6 mm (MNHN-Ga 2681). — Stn 57, 260 m : 1 ♂ 9.0 mm (MNHN-Ga 3274).

SMIB 5 : stn 76, 240-280 m : 1 ♂ 14.7 mm (MNHN-Ga 3275). — Stn 78, 245 m : 1 ov. ♀ 9.0 mm (MNHN-Ga 3276). — Stn 80, 270-300 m : 2 ♂ 8.5 and 16.5 mm (MNHN-Ga 2818). — Stn 94, 275 m : 1 ♀ 9.8 mm (MNHN-Ga 3277).

Loyalty Islands. MUSORSTOM 6 : stn 399, 282 m : 3 ♂ 8.7 to 11.0 mm (MNHN-Ga 2821). — Stn 473, 236 m : 1 ♂ 11.3 mm; 1 ♀ 12.5 mm (MNHN Ga 2679).

TYPES. — The male of 13.5 mm from CHALCAL 2, Stn 19 (MNHN-Ga 2673) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Latin, *guttatus*, spotted, in reference to the colour pattern of the species.

Source : MNHN, Paris

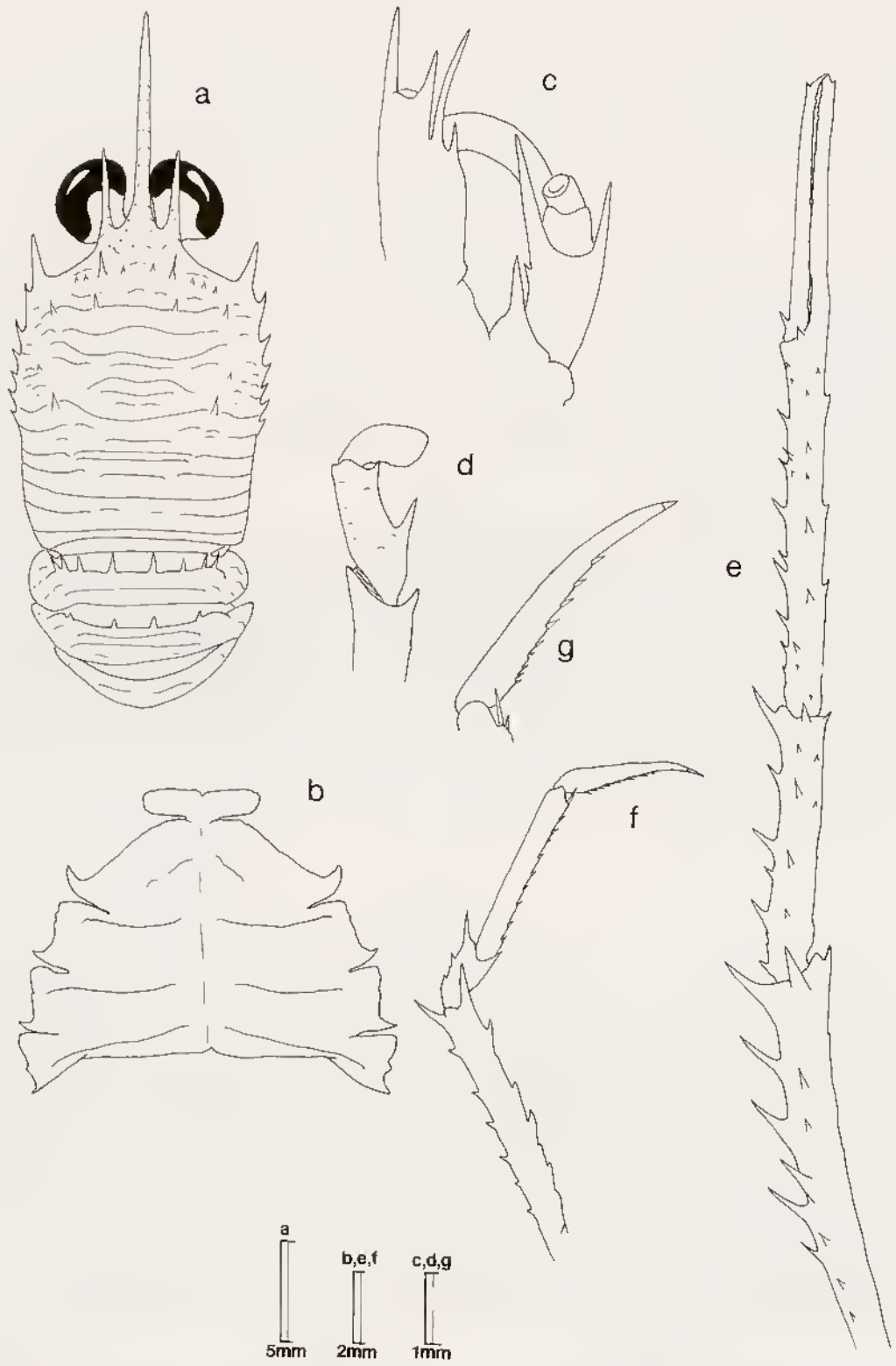

FIG. 19. — *Munida gracilis* Henderson, 1885, ♀ 6.8 mm, from New Zealand, Stn 166 ("*Challenger*") : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

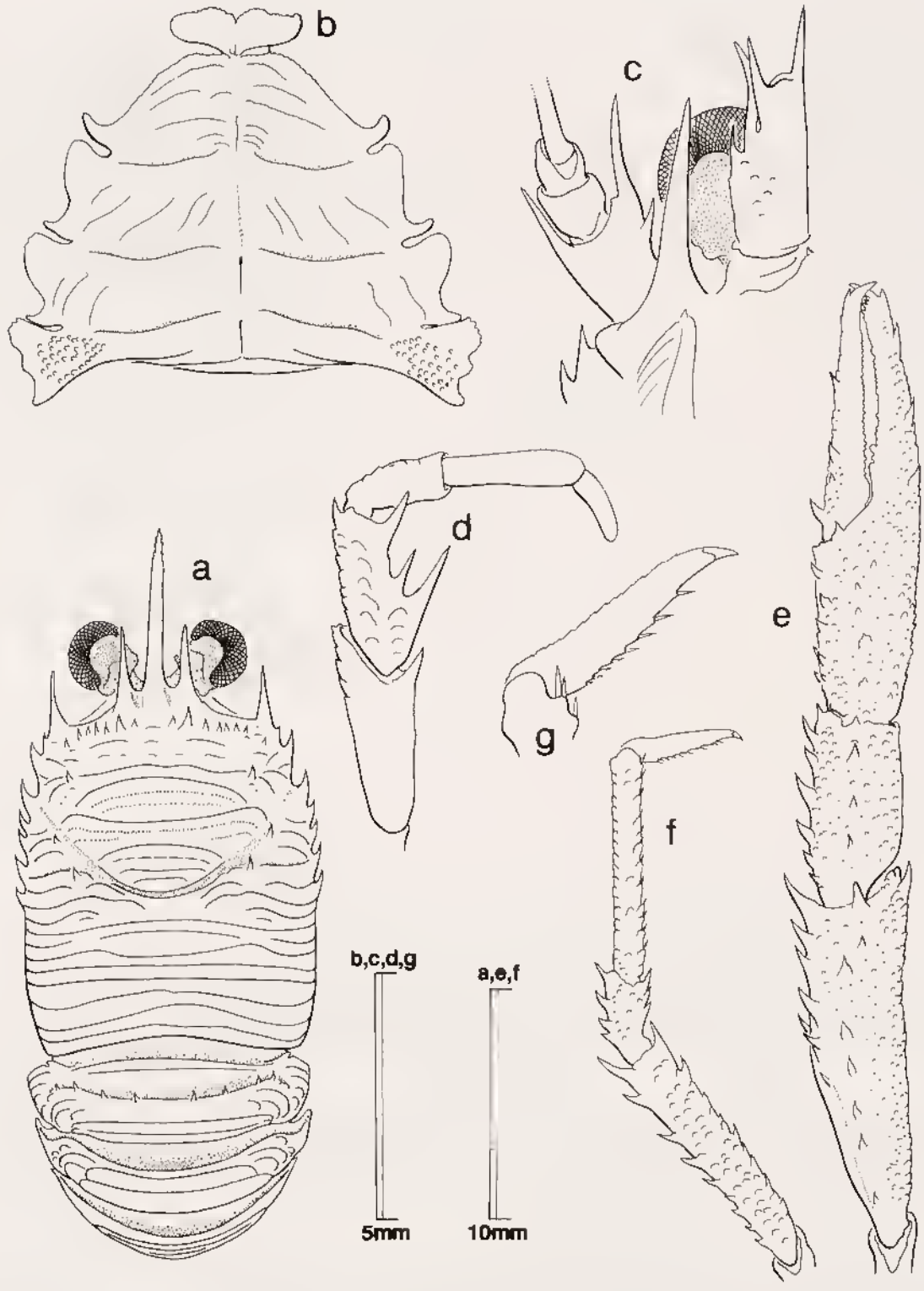

FIG. 20. — *Munida guttata* sp. nov., ♂ 13.5 mm, holotype from Stn 19 (CHALCAL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

DESCRIPTION. — Carapace with numerous secondary striae. Posterior striae not interrupted on intestinal region. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth to sixth thoracic sternites with short arcuate striae; lateral parts of seventh thoracic sternite with numerous coarse granules. Second abdominal tergite with a row of 8-10 spines on anterior ridge. Second and third segments each with 2-4 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, distomesial longer than distolateral. First segment of antennal peduncle with long distomesial spine exceeding third segment; distomesial spine on second segment exceeding antennal peduncle. Extensor margin of merus of third maxilliped with well developed distal spine. Movable and fixed fingers of cheliped with a row of spines along mesial and lateral borders, respectively. Dactylus of walking legs half as long as propodus, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments whitish, with small red spots. Rostrum and supraocular spines orange. Chelipeds and walking legs whitish with red spots. Distal part of chelipeds white. Dactylus of walking legs whitish, with median red spot.

REMARKS. — *M. guttata* resembles *M. distiza* sp. nov. from the Philippines, New Caledonia, Loyalty Islands, Matthew and Hunter Islands. They differ in the following aspects :

— The extensor border of the merus of the third maxilliped has one well developed distal spine in *M. guttata*, absent in *M. distiza*.

— The colour patterns are quite different (see Figs 68, 69 and 73).

SIZE. — The males examined ranged between 5.7 and 16.5 mm, females between 5.8 and 14.5 mm; ovigerous females from 8.3 mm.

DISTRIBUTION. — New Caledonia and Loyalty Islands, between 170 and 320 m.

Munida haswelli Henderson, 1885

Fig. 21

Munida Haswelli Henderson, 1885 : 411.
Munida haswelli - HENDERSON, 1888 : 139, pl. 3, fig. 5. — WHITELEGGE, 1900 : 193. — HALE, 1927 : 80, fig. 76; 1941 : 273. — HAIG, 1973 : 273, 275 (key).

MATERIAL EXAMINED. — **Australia**. "*Challenger*" : stn 163a, 04.04.1874, 36°59'S, 150°20'E, 278 m : 2 ♂ 4.0 and 10.9 mm; 1 ♀ 4.9 mm types (BM).

REMARKS. — *Munida haswelli* has been cited in several localities off southern and western Australia between 90 and 420 m. As in the case of *M. gracilis* Henderson, 1885, from New Zealand (see above), due to the proximity of the area of occurrence of this species with the zone studied in this paper, a description and an illustration is provided.

DIAGNOSIS. — Carapace with secondary striae between main striae. Intestinal region with scales. Protogastric spines behind largest epigastric spines, several parahepatic, one anterior branchial and one postcervical spines on each side. External orbital spine well developed, situated on anterolateral angle of carapace. Branchial margin with 5 spines. Thoracic sternites with short arcuate striae. Second abdominal tergite with 7-9 spines on anterior ridge. Second and third segments each with 3-4 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment reaching end of cornea, distomesial spine longer than distolateral. Distomesial spine on basal segment of antennal peduncle reaching end of second segment; distomesial spine on second segment exceeding peduncle. Merus of third maxilliped with extensor margin armed with distal spine. Cheliped with movable finger armed with one basal and one distal spine; fixed finger with one distal spine. Dactylus of walking legs half as long as propodus, terminal third of ventral margin unarmed.

Source : MNHN, Paris

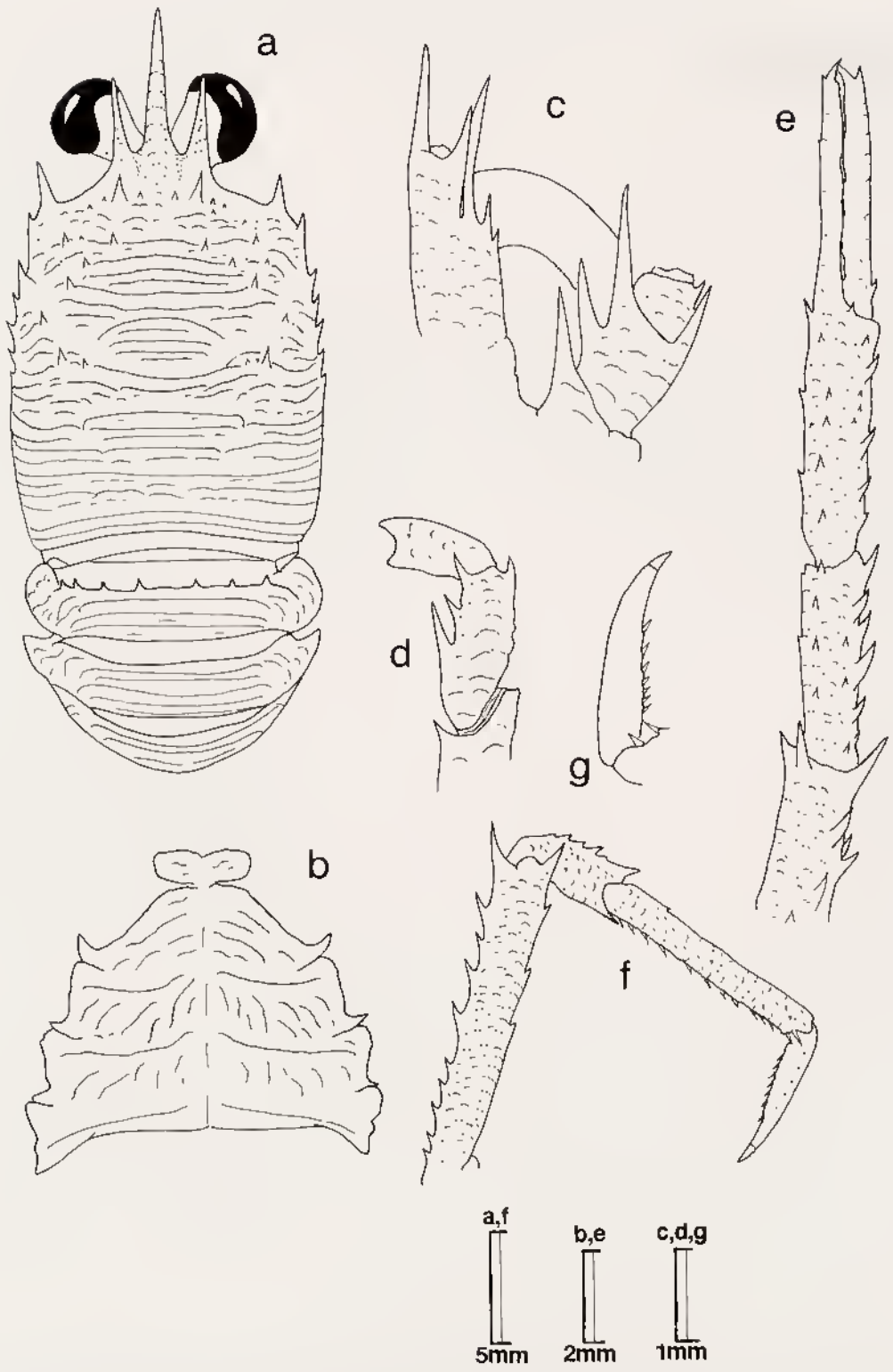

FIG. 21. — *Munida haswelli* Henderson, 1885, **a**-**d**, **f**-**g** : ♂ 10.9 mm, from Australia, Stn 163a (*"Challenger"*); **e** : ♀ 4.9 mm from Australia, Stn 163a (*"Challenger"*). **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, left third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

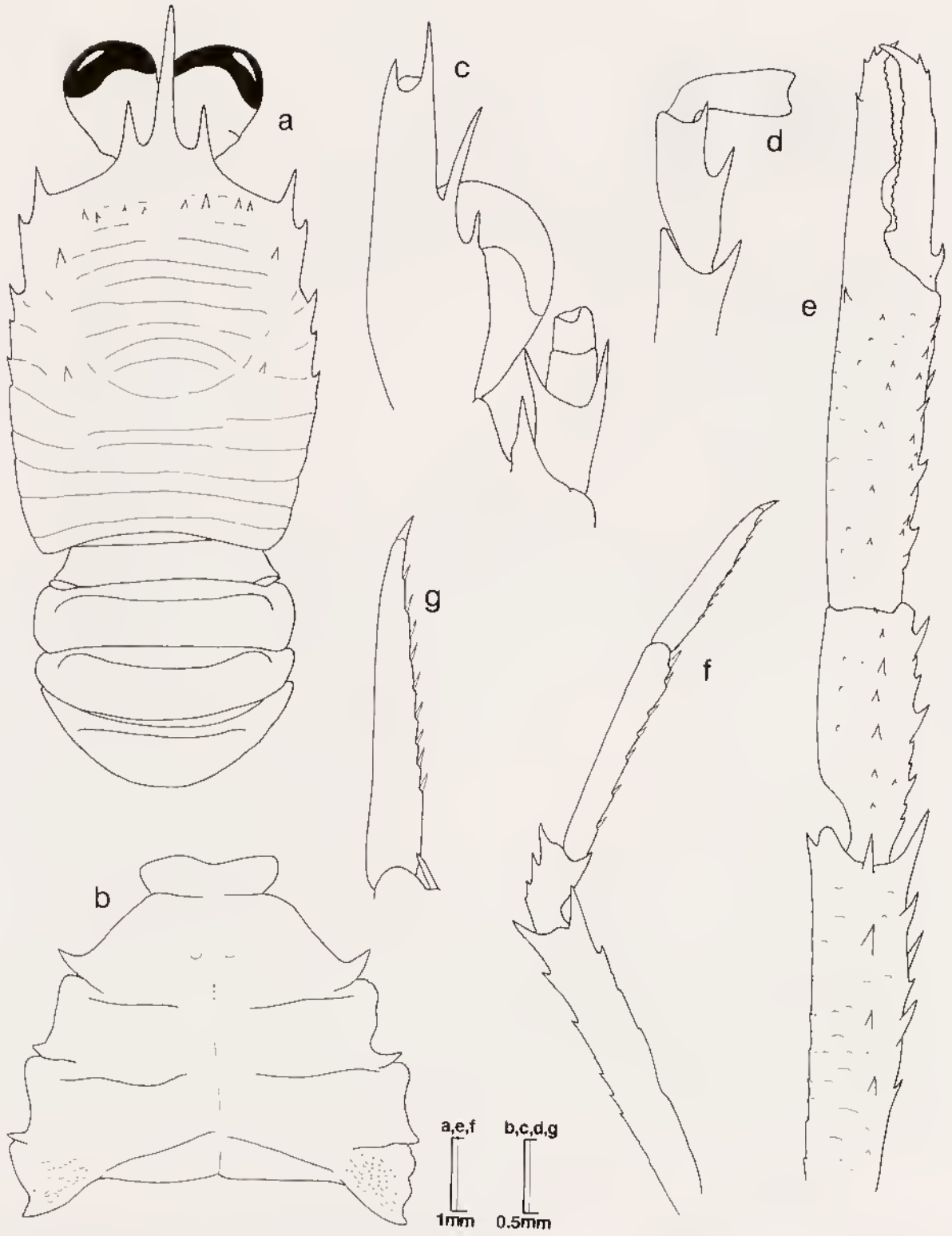

FIG. 22. — *Munida hyalina* sp. nov., ♂ 5.0 mm, holotype from Stn 359 (MUSORSTOM 5) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, left first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

DISTRIBUTION. — Southern and Western Australia, between 90 and 420 m.

Munida hyalina sp. nov.

Fig. 22

MATERIAL EXAMINED. — **New Caledonia**. BIOGEOCAL : stn 253, 310-315 m : 1 ov. ♀ 3.1 mm, paratype (MNHN-Ga 2682).
Chesterfield Islands. MUSORSTOM 5 : stn 359, 700-720 m : 1 ♂ 5.0 mm, holotype (MNHN-Ga 2683).

ETYMOLOGY. — From the Greek, *hyalos*, glass, in reference to the transparent aspect of the species.

DESCRIPTION. — Carapace with transverse ridges weakly distinct, mostly not interrupted. Secondary striae absent. Intestinal region without scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 3 spines. Thoracic sternites without striae; lateral parts of seventh sternite with small granules. Abdominal segments without spines and striae. Male with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) distinctly exceeding cornea, distolateral spine longer than distomesial. First segment of antennal peduncle with distomesial spine reaching end of second segment; distomesial spine on second segment not exceeding antennal peduncle. Extensor border of merus of third maxilliped unarmed. Movable finger of cheliped with basal and distal spines; fixed finger with several distal spines. Dactylus of walking legs 3/4 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. hyalina* is related to *M. minuta* Macpherson, 1993, from the Philippines (MACPHERSON, 1993). Both species differ in several aspects :

— The frontal margins are more oblique in *M. hyalina* than in *M. minuta*.

— The lateral parts of the seventh thoracic sternite have small granules in *M. hyalina*; these granules are absent in *M. minuta*.

— The distal spines on basal antennular segment are subequal in *M. minuta*, whereas the distomesial spine is shorter than the distolateral one in *M. hyalina*.

— The extensor margin of the merus of the third maxilliped has one spine in *M. minuta*, unarmed in *M. hyalina*.

DISTRIBUTION. — New Caledonia and Chesterfield Islands, between 310 and 720 m.

Munida idyia sp. nov.

Fig. 23

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn 170, 485 m : 2 ♂ 8.4 mm, holotype (MNHN-Ga 2648) and 8.5 mm, paratype (MNHN-Ga 2685).

ETYMOLOGY. — The name refers to one of the Oceanids of the Greek mythology (Idyia).

DESCRIPTION. — Carapace with numerous secondary striae. Main striae interrupted on intestinal region. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Thoracic sternites with some arcuate striae; lateral parts of sixth and seventh thoracic sternites with coarse granules. Second abdominal tergite with a row of 9 spines on anterior ridge. Second and third segments each with 2-3 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) slightly exceeding cornea, distomesial slightly longer than distolateral. Basal segment of antennal peduncle with long distomesial spine reaching end of antennal peduncle; distomesial spine on second segment distinctly exceeding antennal peduncle. Extensor border of merus of third maxilliped with small distal spine. Movable finger of cheliped with one basal and one distal spine on mesial

Source : MNHN, Paris

border; fixed finger with several spines along lateral border. Dactylus of walking legs half as long as propodus, with movable spinules along ventral margin, terminal third unarmed.

REMARKS. — *M. idyia* is closely related to *M. tyche* sp. nov. from New Caledonia and Chesterfield Islands, but they differ in several features (see Remarcks under that species).

DISTRIBUTION. — New Caledonia, 485 m.

Munida incerta Henderson, 1888

Fig. 74

Munida incerta · BABA, 1988 : 106 (references); 1990 : 963.

MATERIAL EXAMINED. — **Japan**. Tosa Bay, 150-300 m, 11.1963 : 2 ♂ 19.9 and 22.6 mm (MNHN-Ga 1096).

Philippines. MUSORSTOM 1 : stn 40, 265-287 m : 1 ♂ 23.8 mm; 1 ov. ♀ 22.5 mm; 2 ♀ 13.7 and 16.4 mm (MNHN-Ga 2686). — Stn 50, 415-510 m : 16 ♂ 8.2 to 25.2 mm; 3 ov. ♀ 15.7 to 20.6 mm; 19 ♀ 4.6 to 19.7 mm (MNHN-Ga 2687). — Stn 51, 170-200 m : 1 ♂ 26.0 mm; 1 ov. ♀ 26.3 mm (MNHN-Ga 2688).

MUSORSTOM 2 : stn 40, 280-440 m : 3 ♂ 24.0 to 25.4 mm; 4 ov. ♀ 22.0 to 23.4 mm; 1 ♀ 21.8 mm (MNHN-Ga 2689). — Stn 75, 300-330 m : 11 ♂ 8.0 to 19.7 mm; 22 ♀ 6.8 to 16.5 mm (MNHN-Ga 2690). — Stn 83, 318-320 m : 15 ♂ 10.7 to 28.0 mm; 5 ov. ♀ 20.3 to 27.0 mm; 7 ♀ 9.0 to 18.2 mm (MNHN-Ga 2691).

MUSORSTOM 3 : stn 119, 320-337 m : 14 ♂ 10.1 to 27.4 mm; 5 ov. ♀ 21.0 to 22.2 mm; 16 ♀ 11.1 to 22.4 mm (MNHN-Ga 2692). — Stn 123, 700-702 m : 2 ♂ 6.1 and 18.0 mm (MNHN-Ga 2693). — Stn 133, 334-390 m : 1 ♂ 22.5 mm; 1 ♀ 21.4 mm (MNHN-Ga 2694).

"*Challenger*" : stn 200, 23.10.1874, 06°47'N, 122°28'E, 463 m : 1 ♀ 15.5 mm, type (BM).

Kiribati. 600 m, 05.1987 : 1 ♂ 29.6 mm (MNHN-Ga 2738).

New Caledonia. BIOCAL : stn 40, 650 m : 2 ♂ 28.5 and 31.3 mm (MNHN-Ga 2695). — Stn 52, 540-600 m : 5 ♂ 21.1 to 29.7 mm; 5 ov. ♀ 21.5 to 24.7 mm (MNHN-Ga 2696). — Stn 109, 495-515 m : 1 ov. ♀ 27.5 mm (MNHN-Ga 2697).

MUSORSTOM 4 : stn 156, 530 m : 1 ♂ 26.0 mm (MNHN-Ga 2698). — Stn 158, 620 m : 1 ♂ 22.3 mm; 4 ♀ 5.8 to 12.5 mm (MNHN-Ga 2699). — Stn 159, 600 m : 1 ♂ 17.4 mm (MNHN-Ga 2700). — Stn 169, 600 m : 26 ♂ 7.9 to 28.2 mm; 9 ov. ♀ 18.4 to 24.7 mm ; 14 ♀ 12.2 to 24.7 mm (MNHN-Ga 2701). — Stn 170, 485 m : 2 ♂ 16.0 and 21.5 mm (MNHN-Ga 2702). — Stn 178, 520 m : 3 ♂ 8.5 to 12.4 mm; 1 ov. ♀ 24.7 mm; 2 ♀ 10.0 and 13.4 mm (MNHN-Ga 2703). — Stn 179, 480 m : 1 ♂ 18.9 mm; 1 ♀ 21.0 mm (MNHN-Ga 2704). — Stn 194, 550 m : 3 ♂ 13.0 to 31.9 mm; 10 ov. ♀ 15.0 to 27.3 mm; 3 ♀ 17.2 to 18.0 mm (MNHN-Ga 2705). — Stn 197, 550 m : 2 ♂ 11.2 and 20.5 mm (MNHN-Ga 2706). — Stn 198, 585 m : 30 ♂ 14.7 to 32.0 mm; 22 ov. ♀ 13.9 to 24.4 mm; 20 ♀ 15.4 to 24.2 mm (MNHN-Ga 2707). — Stn 199, 600 m : 19 ♂ 10.4 to 28.7 mm; 6 ov. ♀ 17.5 to 20.4 mm; 11 ♀ 10.4 to 18.7 mm (MNHN-Ga 2708). — Stn 200, 535 m : 6 ♂ 12.2 to 32.2 mm; 3 ov. ♀ 20.6 to 26.7 mm ; 1 ♀ 28.6 mm (MNHN-Ga 2709). — Stn 201, 490 m : 1 ♂ 26.5 mm; 1 ov. ♀ 28.5 mm (MNHN-Ga 2710). — Stn 202, 580 m : 44 ♂ 12.1 to 31.8 mm; 5 ov. ♀ 20.2 to 22.2 mm; 10 ♀ 9.3 to 20.2 mm (MNHN-Ga 2711). — Stn 221, 535-560 m : 2 ♂ 26.5 and 30.5 mm; 2 ♀ 8.0 and 20.0 mm; 1 juv. 5.8 mm (MNHN-Ga 2712). — Stn 223, 545-560 m : 1 ♀ 6.0 mm (MNHN-Ga 2713). — Stn 236, 495-550 m : 12 ♂ 7.6 to 34.5 mm; 1 ov. ♀ 28.6 mm ; 5 ♀ 7.8 to 10.4 mm (MNHN-Ga 2714). — Stn 238, 500-510 m : 1 ♂ 8.0 mm; 1 ♀ 8.3 mm (MNHN-Ga 2715). — Stn 239, 470-475 m : 14 ♂ 8.0 to 35.5 mm; 2 ov. ♀ 27.8 and 29.0 mm; 8 ♀ 6.2 to 17.5 mm (MNHN-Ga 2716). — Stn 240, 475-500 m : 3 ♀ 6.2 to 12.5 mm (MNHN-Ga 2717). — Stn 241, 470-480 m : 2 ♂ 8.0 and 15.7 mm; 3 ov. ♀ 17.0 to 21.6 mm; 3 ♀ 8.4 to 10.5 mm (USNM). — Stn 242, 500-550 m : 16 ♂ 8.0 to 26.0 mm; 15 ♀ 6.3 to 22.7 mm (MNHN-Ga 2719). — Stn 247, 435-460 m : 1 ov. ♀ 20.4 mm (MNHN-Ga 2720).

SMIB 2 : stn 11, 475-500 m : 1 ♂ 24.5 mm (MNHN-Ga 2721).

SMIB 3 : stn 21, 525 m : 1 ♀ 12.9 mm (MNHN-Ga 2722).

Loyalty Islands. MUSORSTOM 6 : stn 466, 540 m : 1 ♂ 12.0 mm; 1 ♀ 17.5 mm (MNHN-Ga 2727). — Stn 469, 630 m : 1 ♀ 12.2 mm (MNHN-Ga 2728). — Stn 470, 560 m : 2 ♂ 18.6 and 20.0 mm; 1 ♀ 21.5 mm (MNHN-Ga 2729). — Stn 489, 700 m : 1 ♀ 14.5 mm (MNHN-Ga 3497).

Chesterfield Islands. MUSORSTOM 5 : stn 341, 620-630 m : 1 ov. ♀ 23.5 mm; 1 ♀ 20.4 mm (MNHN-Ga 2730). — Stn 358, 680-700 m : 1 ♂ 15.5 mm (MNHN-Ga 2731). — Stn 359, 700-720 m : 1 ♂ 29.0 mm (MNHN-Ga 2732). — Stn 363, 685-700 m : 6 ♂ 25.5 to 33.6 mm; 3 ♀ 22.4 to 25.7 mm (MNHN-Ga 2733). — Stn 364, 675 m : 5 ♂ 20.4 to 33.3 mm; 2 ♀ 17.5 and 24.6 mm (MNHN-Ga 2734). — Stn 365, 710 m : 9 ♂ 23.0 to 34.3 mm; 1 ♀ 24.0 mm (MNHN-Ga 2870). — Stn 383, 600-615 m : 3 ♂ 16.4 to 24.9 mm; 5 ov. ♀ 23.6 to 28.0 mm; 5 ♀ 13.5 to 18.0 mm (MNHN-Ga 2735). — Stn 387, 650-660 m : 3 ♂ 30.0 to 34.3 mm; 1 ♀ 24.4 mm (MNHN-Ga 2736). — Stn 389, 500 m : 1 ♂ 20.4 mm (MNHN-Ga 2737).

Source : MNHN, Paris

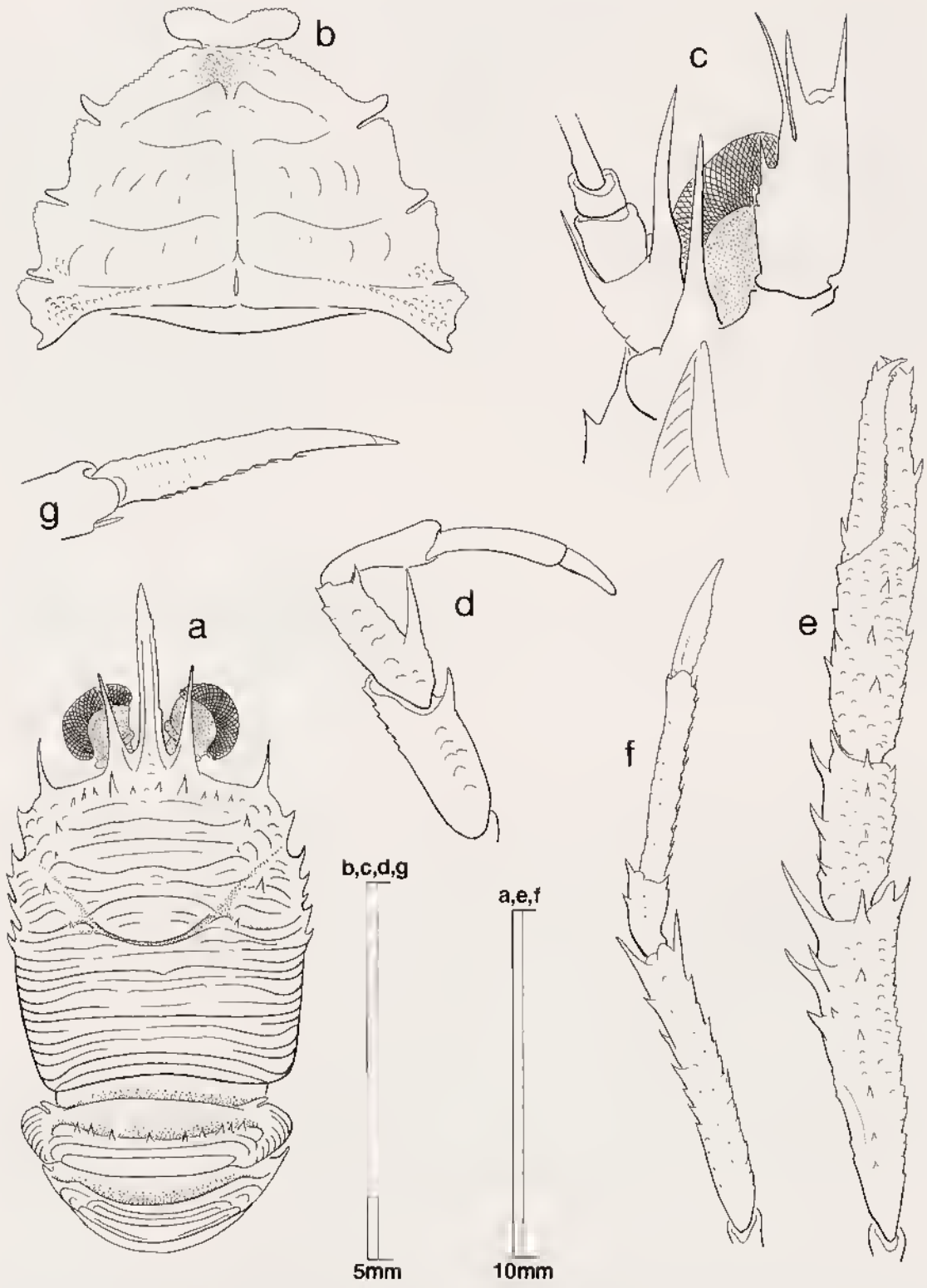

FIG. 23.— *Munida idyia* sp. nov., ♂ 8.4 mm, holotype from Stn 170 (MUSORSTOM 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

CORAIL 2 : stn 13, 700-705 m : 1 ♂ 29.8 mm (MNHN-Ga 2723). — Stn 15, 580-590 m : 2 ♂ 14.7 and 16.0 mm; 10 ov. ♀ 19.4 to 25.0 mm; 5 ♀ 8.0 to 26.1 mm (MNHN-Ga 2724). — Stn 16, 500 m : 1 ♂ 32.0 mm; 2 ov. ♀ 25.0 and 25.5 mm (MNHN-Ga 2725). — Stn 17, 500 m : 1 ov. ♀ 28.7 mm (MNHN-Ga 2726).

REMARKS. — The New Caledonian specimens agree quite well with the type material and additional information provided by other authors (BABA, 1988, 1990). Several differences are observed between the specimens from the different localities, although they are not constant (e.g. the chelipeds are more cylindrical in Philippine specimens, whereas those from New Caledonia are more polygonal). Some specimens from New Caledonia have the chelipeds more granulated and the supraocular spines more divergent than in the Philippine material. Furthermore, BABA (personnal communication) has observed distinct differences in the colour pattern between the Kei Islands (Indonesia) and the Western Australian specimens as well as in the morphology of the telson in males. These differences suggest the existence of several species or forms, and a future revision of this species is recommended.

The colour pattern of the specimens collected in New Caledonia is as follows : Ground colour of carapace and abdomen orange, spines dark orange; epigastric region pinkish. Chelipeds and walking legs with transverse whitish and red bands; distal part of fingers of chelipeds and dactylus of walking legs whitish. This pattern agrees quite well with the figure provided by BABA (1986c).

SIZE. — The males examined ranged between 8.0 and 35.5 mm, females between 5.8 and 29.0 mm; ovigerous females from 13.9 mm.

DISTRIBUTION. — Previously known from southern Mozambique, Madagascar, Malay Archipelago, the Philippines and Japan, between 17 to 658 m (BABA, 1990). The specimens from New Caledonia and adjacent waters were caught between 435 and 720 m. The present material from the Philippines was collected between 170 and 702 m.

Munida javieri sp. nov.

Figs 24, 75

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 183, 280 m : 1 ♀ 4.7 mm (USNM).

SMIB 4 : stn 42, 320 m : 1 ♂ 12.2 mm; 1 ♀ 8.6 mm (MNHN-Ga 2740, 2741). — Stn 44, 270-300 m : 1 ♀ 6.0 mm (MNHN-Ga 2742).

Matthew and Hunter Islands. VOLSMAR : stn 50, 425 m : 1 ♀ 5.4 mm (MNHN-Ga 2743).

Chesterfield Islands. MUSORSTOM 5 : stn 305, 430-440 m : 1 ♀ 7.6 mm; 1 juv. 4.3 mm (MNHN-Ga 2744).

TYPES. — One male (12.2 mm) from SMIB 4, Stn 42 (MNHN-Ga 2740) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to my son Javier.

DESCRIPTION. — Dorsal surface of carapace moderately strigose, with only 1 or 2 complete transverse striae on posterior portion; remainig striae interrupted. Rostrum and supraocular spines dorsally carinated. External orbital spine small, situated on frontal border, mesial to lateral margin. Branchial margin with 3 spines. Fourth thoracic sternite with several short arcuate striae; fifth to seventh sternites without striae. Abdominal segments unarmed. Second and third segments each with one transverse stria. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) not exceeding cornea, with 2 short subequal distal spines. First segment of antennal peduncle with short distomesial spine not reaching midlength of second segment and one small distolateral spine; distomesial spine on second segment exceeding antennal peduncle; small distal spines on mesial and lateral angle of third segment. Extensor margin of merus of third maxilliped unarmed. Fixed finger of cheliped with a lateral row of spines; movable finger with a row of spines along mesial border; dorsal side of both fingers with a row of spines, absent in juvenile specimen. Dactylus of walking legs 1/2 propodus length, with movable spinules along entire ventral margin.

Source : MNHN, Paris

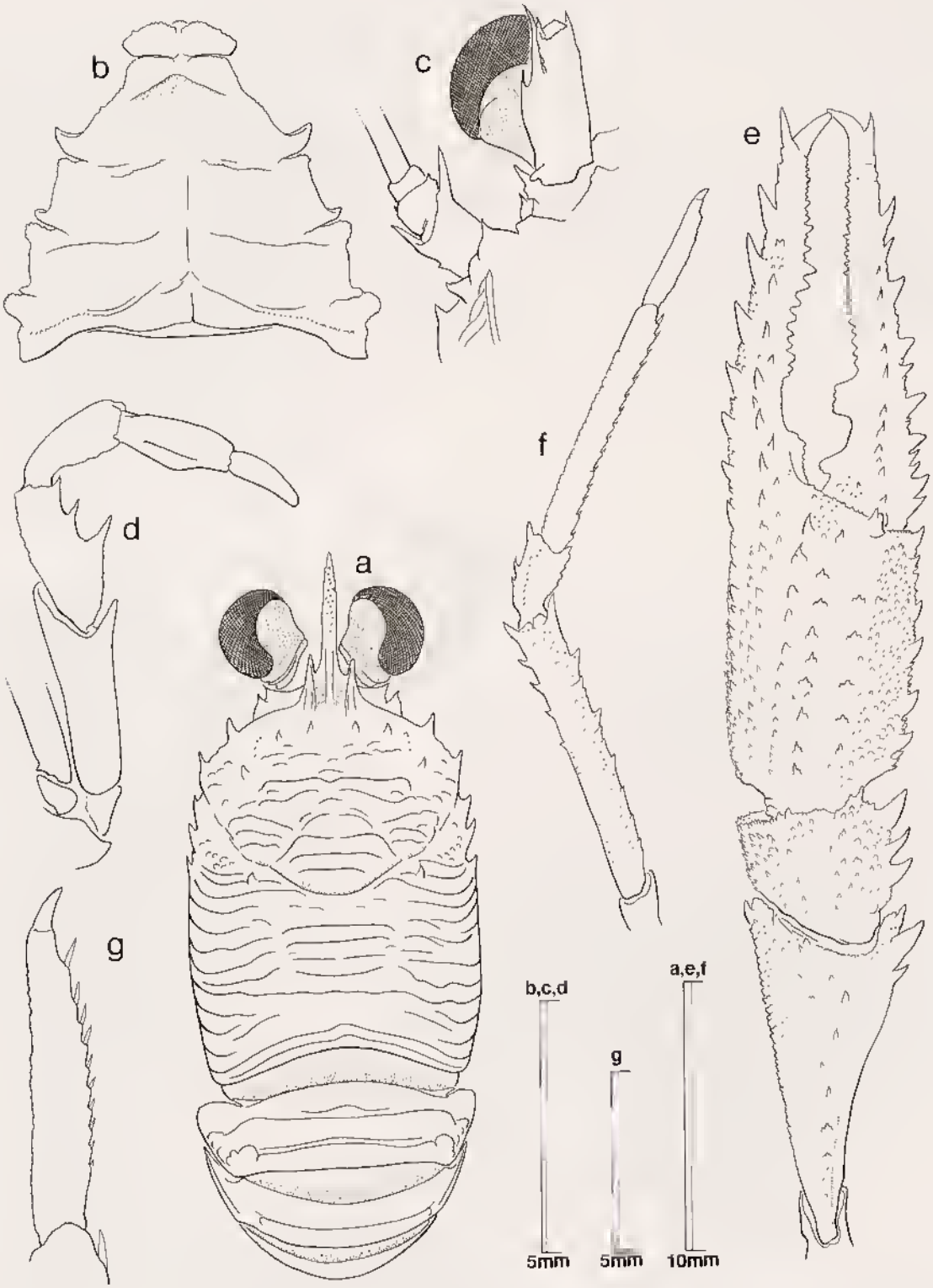

FIG. 24. — *Munida javieri* sp. nov., ♂ 12.2 mm, holotype from Stn 42 (SMIB 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

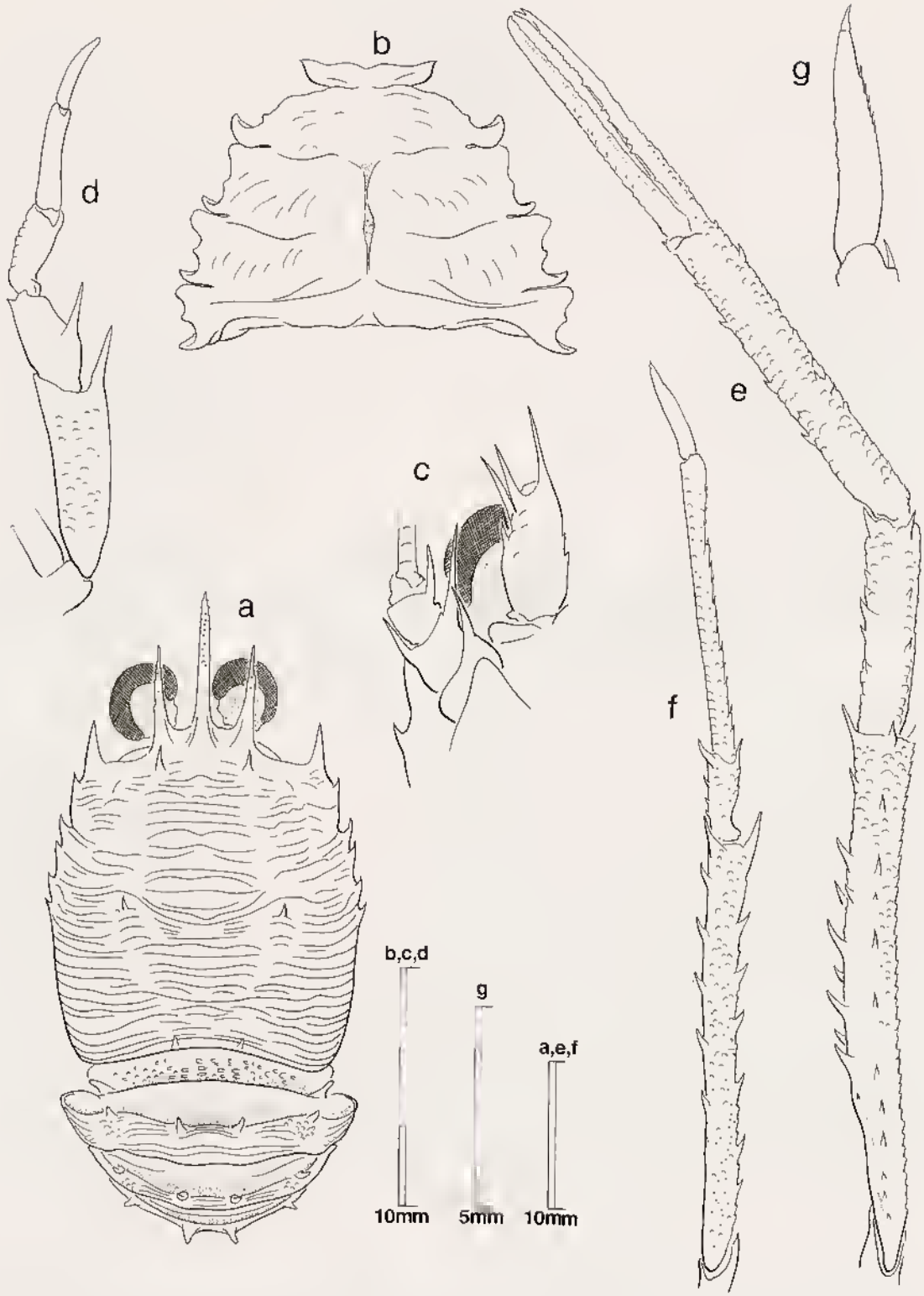

FIG. 25. — *Munida laurentae* sp. nov., ♂ 15.3 mm, holotype from Stn 1 (CHALCAL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

COLOUR. — Ground colour of carapace and abdominal segments yellow; purple spots on epigastric and mesogastric regions; purple band along cervical groove, lateral margins of branchial regions and posterior border of carapace. Rostrum and supraocular spines orange. Spines on carapace surface reddish. Chelipeds orange, with whitish spots; distal half of fingers whitish; one red spot on hand near base of movable finger. Walking legs whitish.

REMARKS. — *M. javieri* resembles *M. hystrix* Macpherson & de Saint Laurent, 1991, from French Polynesia (MACPHERSON & DE SAINT LAURENT, 1991). The two species are easily differentiable by the spinulation of the carapace ; *M. hystrix* has the anterior half of the dorsal carapace surface with numerous regular spines extending to second postcervical stria; *M. javieri* has the dorsal carapace surface armed with epigastric and parahepatic spines, but no other spinulation in front of the cervical groove. The colour patterns are also different : *M. hystrix* has the ground colour of the carapace whitish, with reddish spots and transverse red bands, chelipeds whitish with red bands; *M. javieri* has the ground colour of the carapace yellow, with purple spots and bands, the chelipeds are orange with whitish spots and with one red spot on the hand.

SIZE. — The male measured 12.2 mm; females ranged between 4.7 and 8.6 mm.

DISTRIBUTION. — New Caledonia, Chesterfield Islands, Matthew and Hunter Islands, between 280 and 440 m.

Munida laurentae sp. nov.

Figs 25, 92

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 45, 430-465 m : 2 ♂ 14.7 and 17.1 mm; 4 ov. ♀ 13.0 to 19.1 mm (MNHN-Ga 2746). — Stn 46, 570-610 m : 2 ♀ 5.7 and 7.0 mm (MNHN-Ga 2747). — Stn 47, 550 m : 1 ♂ 28.6 mm (MNHN-Ga 2748). — Stn 52, 540-600 m : 2 ♂ 8.2 and 10.9 mm; 4 ♀ 6.2 to 12.5 mm (MNHN-Ga 2749). — Stn 66, 505-515 m : 2 ♂ 11.2 and 13.3 mm (MNHN-Ga 2750). — Stn 67, 500-510 m : 2 ♂ 13.5 and 16.7 mm; 1 ov. ♀ 12.2 mm; 1 ♀ 13.4 mm (MNHN-Ga 2751). — Stn 81, 430 m : 2 ♂ 7.2 and 10.2 mm (MNHN-Ga 2752).

MUSORSTOM 4 : stn 155, 500-570 m : 2 ov. ♀ 12.8 and 14.7 mm (MNHN-Ga 2753). — Stn 194, 550 m : 1 ♂ 9.0 mm (MNHN-Ga 2754). — Stn 195, 470 m : 5 ♂ 9.0 to 16.2 mm; 2 ov. ♀ 12.3 and 15.8 mm; 4 ♀ 9.6 to 12.0 mm (MNHN-Ga 2755). — Stn 215, 485-520 m : 5 ♂ 16.4 to 20.0 mm; 1 ov. ♀ 14.4 mm (MNHN-Ga 2757).

SMIB 1 : stn 7, 500 m : 1 ♂ 19.8 mm; 1 ♀ 16.6 mm (MNHN-Ga 2745).

CHALCAL 2 : stn 1, 500-580 m : 1 ♂ 15.3 mm; 1 ov. ♀ 15.4 mm; 1 ♀ 20.0 mm (MNHN-Ga 2761, 2762). — Stn 2 500 -610 m : 16 ♂ 10.0 to 17.4 mm; 6 ov. ♀ 14.0 to 19.0 mm; 7 ♀ 9.2 to 18.8 mm (USNM). — Stn 21, 580 m : 6 ♂ 9.4 to 14.6 mm; 2 ov. ♀ 12.4 and 15.3 mm; 2 ♀ 8.8 and 11.8 mm (MNHN-Ga 2764). — Stn 72, 527 m : 3 ♂ 9.4 to 11.8 mm (MNHN-Ga 2765). — Stn 73, 573 m : 1 ♂ 8.6 mm (MNHN-Ga 2766). — Stn 75, 600 m : 4 ♀ 8.1 to 9.5 mm (MNHN-Ga 2767). — Stn 82, 304 m : 1 ♂ 19.4 mm; 2 ov. ♀ 16.0 and 17.0 mm (MNHN-Ga 2768).

SMIB 3 : stn 1, 520 m : 2 ♂ 10.7 and 12.8 mm; 1 ♀ 11.6 mm (MNHN-Ga 2769). — Stn 2, 530-537 m : 1 ov. ♀ 13.3 mm (MNHN-Ga 2770). — Stn 3, 530 m : 1 ♀ 9.8 mm (MNHN-Ga 2771). — Stn 7, 505 m : 1 ♂ 12.2 mm (MNHN-Ga 2772). — Stn 12, 470 m : 1 ♂ 13.6 mm; 1 ♀ 8.5 mm (MNHN-Ga 2773). — Stn 22, 503 m : 3 ♂ 17.4 to 20.3 mm (MNHN-Ga 2775).

SMIB 4 : stn 34, 510-515 m : 2 ♂ 9.0 and 12.5 mm; 3 ♀ 7.9 to 12.0 mm (MNHN-Ga 2780). — Stn 36, 530 m : 1 ♂ 9.3 mm (MNHN-Ga 2781). — Stn 37, 540 m : 2 ♂ 8.3 and 9.1 mm; 4 ♀ 7.2 to 13.8 mm (MNHN-Ga 2782). — Stn 39, 560 m : 3 ♂ 12.4 to 16.4 mm; 1 ♀ 15.3 mm (MNHN-Ga 2784). — Stn 55, 260 m : 3 ♀ 6.9 to 17.5 mm (MNHN-Ga 2785). — Stn 58, 560 m : 2 ♂ 8.2 and 11.8 mm (MNHN-Ga 2786). — Stn 69, 405 m : 1 ov. ♀ 17.5 mm (MNHN-Ga 2787).

AZTÈQUE : stn 3, 290-400 m : 1 ♀ 29.6 mm (MNHN-Ga 2788). — Stn 6, 425-470 m : 6 ♂ 15.7 to 17.5 mm; 3 ♀ 13.8 to 31.5 mm (MNHN-Ga 2789).

Loyalty Islands. MUSORSTOM 6 : stn 393, 420 m : 1 ♂ 12.7 mm (MNHN-Ga 2776). — Stn 466, 540 m : 1 ♀ 14.8 mm (MNHN-Ga 2777). — Stn 467, 575 m : 1 ♂ 14.6 mm (MNHN-Ga 2778). — Stn 470, 560 m : 2 ov. ♀ 16.4 and 17.3 mm; 1 ♀ 16.3 mm (MNHN-Ga 2779).

Matthew and Hunter Islands. VOLSMAR : stn 38, 420 m : 1 ov. ♀ 15.5 mm (MNHN-Ga 2790).

Chesterfield Islands. MUSORSTOM 5 : stn 306, 375-415 m : 2 ♂ 5.8 and 10.0 mm; 1 ov. ♀ 13.7 mm (MNHN-Ga 2791). — Stn 338, 540-580 m : 1 ♂ 12.9 mm (MNHN-Ga 2792). — Stn 388, 500-510 m : 1 ♂ 16.3 mm (MNHN-Ga 2793).

TYPES. — One male of 15.3 mm from CHALCAL 2, Stn 1 (MNHN-Ga 2761) has been selected as holotype; the other specimens are paratypes.

Source : MNHN, Paris

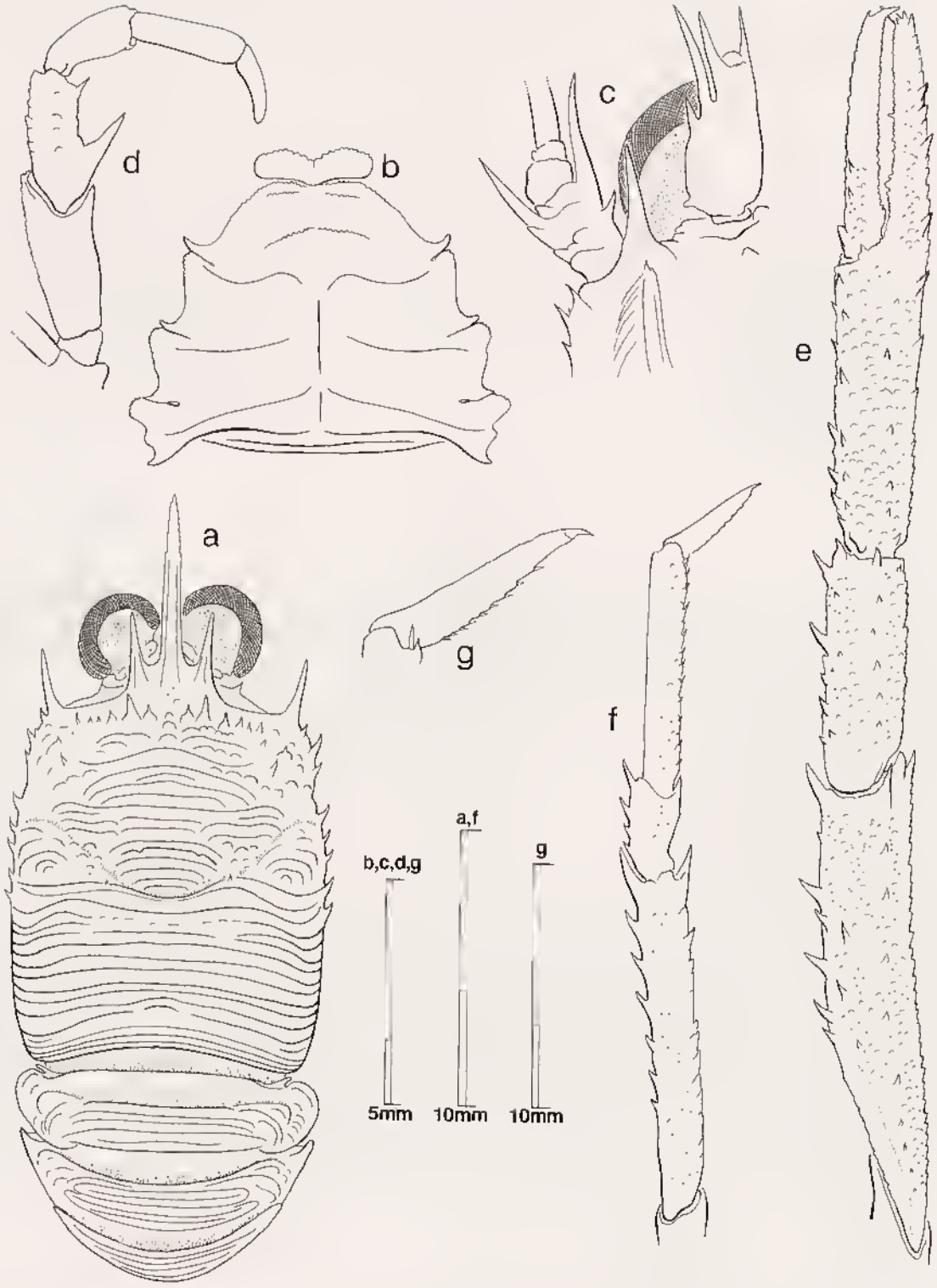

FIG. 26. — *Munida leagora* sp. nov., ♂ 12.0 mm, holotype from Stn 78 (BIOCAL) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

ETYMOLOGY. — It is a pleasure to dedicate this species to Michèle DE SAINT LAURENT from the Muséum national d'Histoire naturelle, Paris for her continuous support in my work.

DESCRIPTION . — Carapace with numerous secondary striae. Gastric region with 2 epigastric spines placed behind supraoculars. One postcervical spine on each side, occasionally 1-2 small spines behind each postcervical spine. Cardiac region without spines. Posterior transverse ridge armed with 2 median spines. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines. Thoracic sternites with numerous striae. Abdominal segments with numerous striae. Second, third and fourth segments each with 4 spines on anterior transverse ridge; posterior ridge of fourth segment unarmed. Males with gonopods absent from first abdominal segment. Eye moderately large, maximum corneal diameter 1/3 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment (distal spines excluded) reaching end of cornea, distomesial spine longer than distolateral. First antennal segment moderately produced on mesial margin, slightly exceeding second segment; distomesial spine on second segment exceeding antennal peduncle; third segment with long distomesial spine, exceeding antennal peduncle. Merus of third maxilliped bearing one median marginal spine on flexor border and one distomarginal spine on extensor margin. Fingers of cheliped subcylindrical, distally curving and crossing, ending in sharp point; one spine located near tip of fixed finger. Dactylus of walking legs 1/3 propodus length, with dorsal border slightly concave, ventral border convex, with median corneae spinules, unarmed on proximal and distal parts.

COLOUR. — Ground colour of carapace and abdomen orange; red spot on intestinal region, absent in larger specimens; median part of abdominal segments whitish. Rostrum orange. Chelipeds and walking legs with transverse whitish and red bands; proximal third of fingers of chelipeds reddish, distal part whitish. Dactylus of walking legs whitish.

REMARKS. — *M. laurentae* is related to *M. pilosimanus* Baba, 1969, from Japan (BABA, 1969a). The comparison of the new species with several specimens from Kyushu-Palau Ridge reported by BABA (1986c) (1 ♂ 11.9 mm; 2 ov. ♀ 14.7 and 16.4 mm) shows several constant differences :

— One well developed parahepatic spine on each side in *M. pilosimanus*, absent in the new species.

— The striae on the thoracic sternites are more numerous in *M. laurentae* than in *M. pilosimanus*.

— The mesial spine on the basal antennal segment not exceed the second segment in *M. pilosimanus*, whereas in the new species this spine exceeds the second segment. The mesial spine on the second antennal segment exceeds the antennal peduncle in *M. laurentae*, not in *M. pilosimanus*.

— One distal spine on the extensor border of the merus of the third maxilliped in *M. laurentae*. This spine is absent in *M. pilosimanus*.

M. laurentae is also close to *M. ocyrhoe* sp. nov. from New Caledonia and Chesterfield Islands (see below for the differences between these species).

SIZE. — The males examined ranged between 5.8 and 28.6 mm; females between 5.7 and 31.5 mm; ovigerous females from 12.2 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands, Chesterfield Islands, Matthew and Hunter Islands, between 260 and 610 m.

Munida leagora sp. nov.

Figs 26, 76

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 67, 500 m : 16 ♂ 9.3 to 13.0 mm; 2 ov. ♀ 7.7 and 9.8 mm (MNHN-Ga 2794 and USNM). — Stn 77, 440 m : 2 ♂ 7.1 and 10.3 mm (MNHN-Ga 3279). — Stn 78, 445-450 m : 8 ♂ 7.7 to 14.4 mm; 2 ov. ♀ 8.0 and 12.7 mm; 3 ♀ 6.3 to 11.7 mm (MNHN-Ga 2795, 2796). — Stn 82, 440 m : 3 ♂ 7.0 to 12.4 mm; 1 ♀ 4.9 mm (MNHN-Ga 3280).

MUSORSTOM 4 : stn 180, 450 m : 1 ♂ 4.0 mm; 1 ♀ 5.0 mm (MNHN-Ga 2797). — Stn 238, 500-510 m : 1 ♀ 14.6 mm (MNHN-Ga 3282). — Stn 239, 470-475 m : 2 ♂ 8.2 and 8.9 mm; 1 ♀ 9.0 mm (MNHN-Ga 3283).

CHALCAL 2 : stn 21, 500 m : 10 ♂ 8.0 to 13.2 mm (MNHN-Ga 3281).

Source : MNHN, Paris

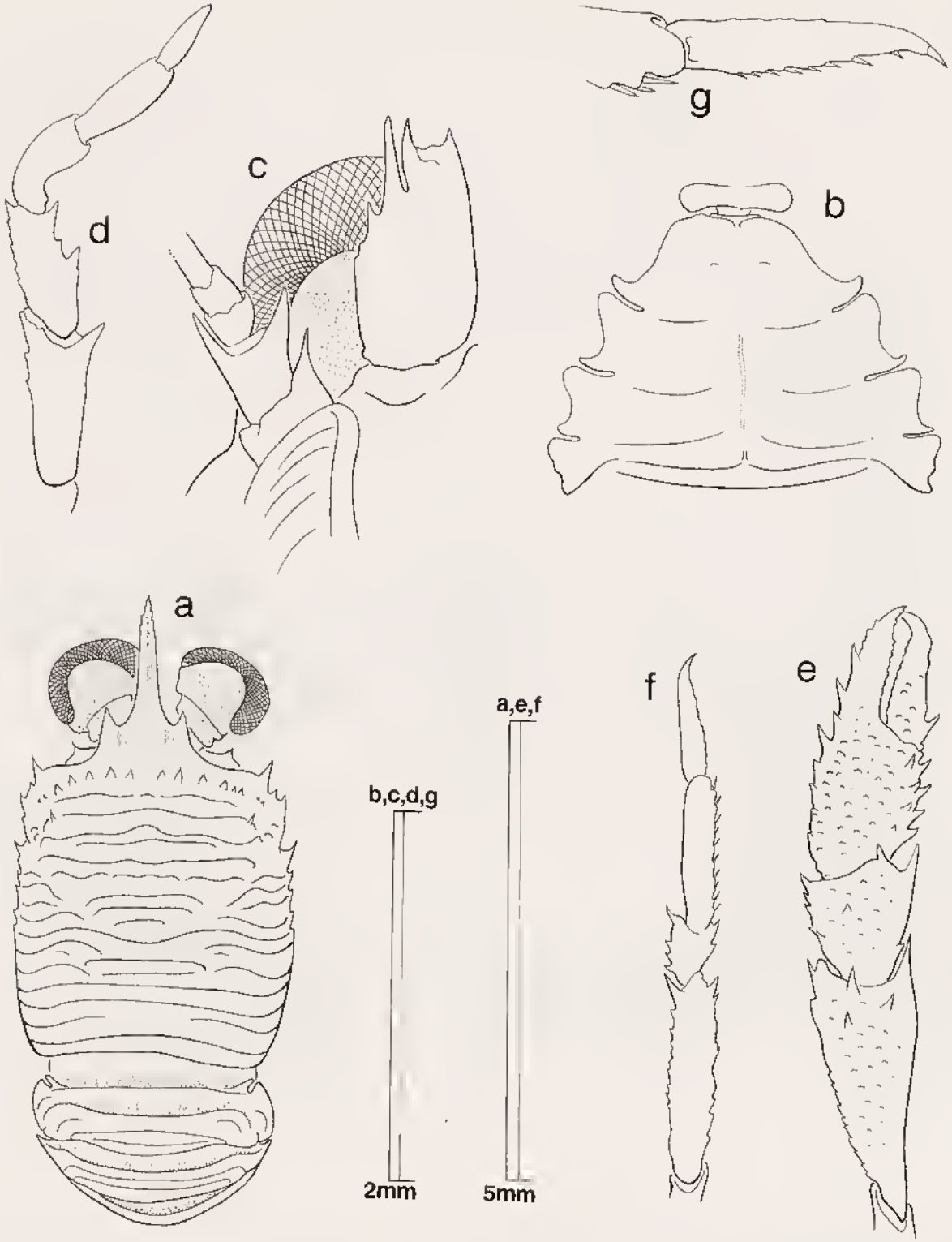

FIG. 27. — *Munida leptitis* sp. nov., ♀ 3.4 mm, holotype from Stn 431 (MUSORSTOM 6) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

SMIB 3 : stn 1, 520 m : 8 ♂ 6.8 to 11.6 mm; 3 ov. ♀ 6.7 to 9.3 mm (MNHN-Ga 2798).

SMIB 4 : stn 34, 515 m : 1 ov. ♀ 11.4 mm; 3 ♀ 8.3 to 9.2 mm (MNHN-Ga 3285). — Stn 38, 510 m : 2 ♂ 11.4 and 11.6 mm (MNHN-Ga 2803).

Loyalty Islands. MUSORSTOM 6 : stn 391, 390 m : 1 ♂ 6.3 mm; 1 ♀ 6.1 mm (MNHN-Ga 2799). — Stn 408, 380 m : 1 ♂ 10.0 mm (MNHN-Ga 3284). — Stn 419, 283 m ; 4 ♂ 7.3 to 9.4 mm; 2 ov. ♀ 6.9 and 9.0 mm; 3 ♀ 6.7 and 7.6 mm (MNHN-Ga 3505). — Stn 428, 420 m : 2 ♂ 7.8 and 11.9 mm (MNHN-Ga 2800). — Stn 460 : 420 m : 1 ♂ 8.9 mm (MNHN-Ga 2801). — Stn 478, 400 m : 1 ♀ 6.8 mm (MNHN-Ga 2802). — Stn 485, 350 m : 1 ♂ 10.8 mm (MNHN-Ga 3506).

Chesterfield Islands. MUSORSTOM 5 : stn 258, 300 m : 2 ov. ♀ 5.2 and 5.6 mm (MNHN-Ga 3509). — Stn 267, 285 m : 1 ♀ 2.7 mm (MNHN-Ga 3510). — Stn 274, 285 m : 1 ♀ 4.1 mm (MNHN-Ga 3509). — Stn 278, 265 m : 1 ov. ♀ 6.9 mm (MNHN-Ga 2804). — Stn 300, 450 m : 6 ♂ 6.9 mm; 8 ov. ♀ 6.2 to 9.2 mm (MNHN-Ga 3286). — Stn 301, 487-610 m : 18 ♂ 5.4 to 11.0 mm; 7 ov. ♀ 5.7 to 7.3 mm; 6 ♀ 4.7 to 6.8 mm (MNHN-Ga 2805). — Stn 305, 430-440 m : 20 ♂ 4.3 to 10.2 mm; 6 ov. ♀ 5.6 to 9.0 mm; 10 ♀ 3.6 to 7.0 mm (MNHN-Ga 2806). — Stn 306, 375-415 m : 10 ♂ 5.1 to 11.3; 1 ov. ♀ 7.6 mm; 3 ♀ 5.3 to 5.9 mm (MNHN-Ga 2807). — Stn 332, 400 m : 3 ♂ 9.2 to 10.8 mm; 1 ov. ♀ 10.0 mm (MNHN-Ga 2808). — Stn 338, 540-580 m : 2 ♂ 6.3 and 11.0 mm (MNHN-Ga 2809).

TYPES. — The male of 12.0 mm from BIOCAL, Stn 78 (MNHN-Ga 2795) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (Leagora).

DESCRIPTION . — Carapace with secondary striae between main striae. Posteriormost major stria not medially interrupted, except in small specimens. Intestinal region with one scale. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few striae; fifth to seventh without striae. Abdominal segments unarmed. Second and third segments each with 3-5 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) ending at same level of cornea, with 2 subequal distal spines. First segment of antennal peduncle with long distomesial spine reaching end of second segment; distomesial spine on second segment distinctly exceeding antennal peduncle. Extensor border of merus of third maxilliped unarmed. Fixed finger of cheliped with a row of spines along lateral margin; movable finger with three spines along proximal half of mesial margin, and one distal spine. Dactylus of walking legs 1/2 propodus length, with movable spinules along ventral margin, distal fourth unarmed.

COLOUR. — Carapace with wide transverse yellow and purple bands. Epigastric, mesogastric and cardiac regions with purple spot. Purple band along cervical groove. Second abdominal segment with median and lateral purple and yellow spots. Chelipeds and walking legs light orange; spines and some granules reddish. Distal part of fingers of chelipeds and dactylus of walking legs whitish.

REMARKS. — *M. leagora* is closely related to *M. pseliophora* sp. nov. from Loyalty Islands and Chesterfield Islands, however they can be distinguished by several features (see Remarks under that species).

SIZE. — The males examined ranged between 4.0 and 14.4 mm, females between 3.2 and 14.6 mm; ovigerous females from 5.2 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Chesterfield Islands, between 265 and 580 m.

Munida leptitis sp. nov.

Fig. 27

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 82, 440 m : 1 ♂ 5.2 mm, paratype (MNHN-Ga 3287). **Loyalty Islands**. MUSORSTOM 6 : stn 431, 21 m : 1 ♀ 3.4 mm, holotype (MNHN-Ga 2810).

ETYMOLOGY. — From the Greek, *leptitis*, smallness. The name is considered as a substantive in apposition.

Source : MNHN, Paris

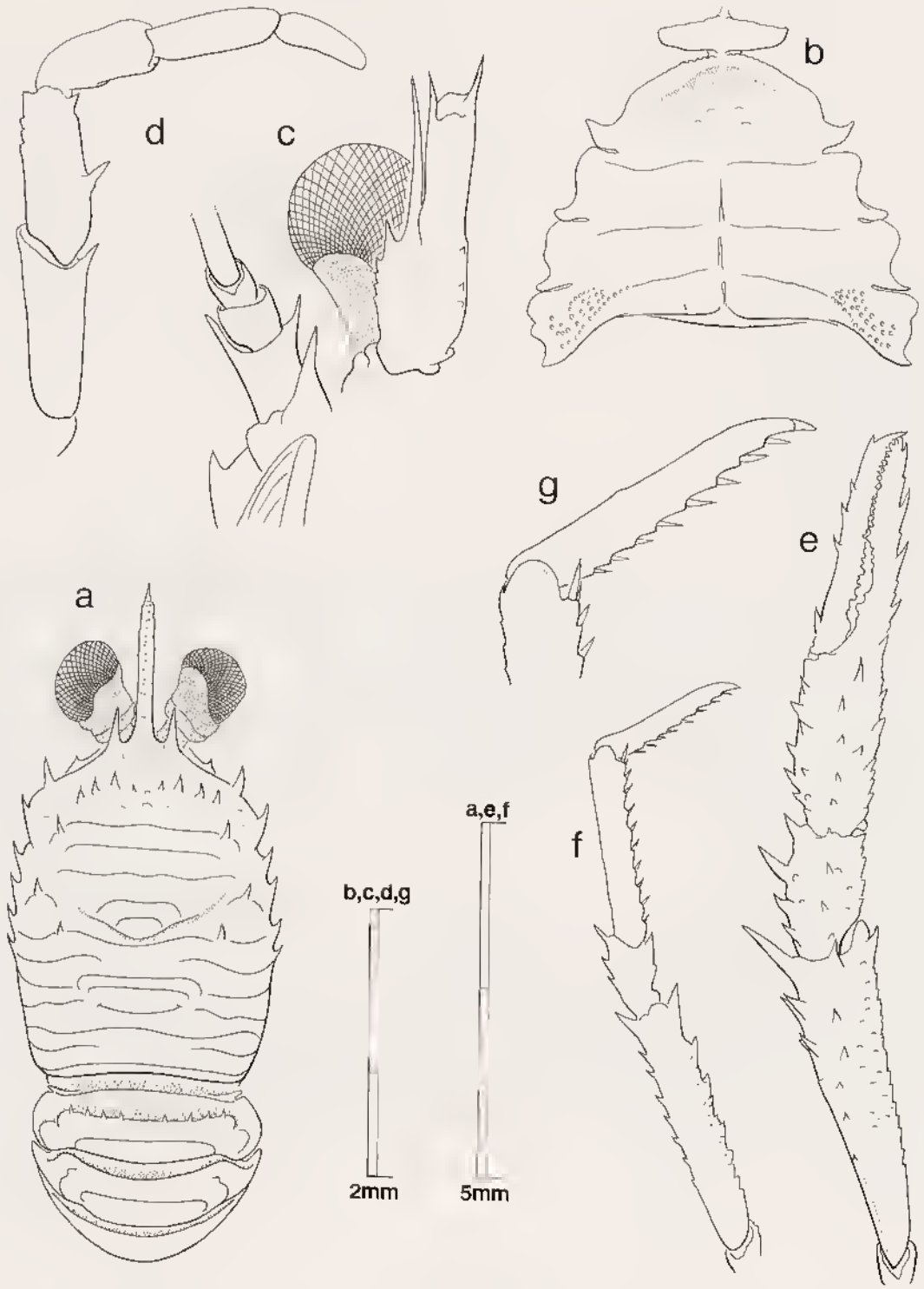

FIG. 28. — *Munida leptosyne* sp. nov., ov. ♀ 4.8 mm, holotype from Stn 441 (MUSORSTOM 6) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. External orbital spine short, situated at anterolateral angle of carapace. Branchial margin with 5 small spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh smooth. Abdominal segments unarmed. Second and third segments each with 2 transverse striae. Male with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) ending at same level as the cornea, distomesial spine shorter than distolateral. First segment of antennal peduncle with distomesial spine not reaching end of second segment; distomesial spine on second segment reaching end of third segment. Extensor margin of merus of third maxilliped with distal spine. Fixed finger of cheliped with a row of spines along lateral border; movable finger with basal spine. Dactylus of walking legs as long as propodus, with movable spinules along entire ventral margin.

REMARKS. — *M. leptitis* is closely related to *M. stia* sp. nov. from New Caledonia and Chesterfield Islands (see below for their relationships).

DISTRIBUTION. — Loyalty Islands and New Caledonia, 21 and 440 m.

Munida leptosyne sp. nov.

Fig. 28

MATERIAL EXAMINED. — **New Caledonia**. Meurthe Passage, 16.11.1991, 6-10 m : 6 ♂ 5.8 to 6.0 mm; 1 ov. ♀ 5.3 mm (MNHN-Ga 3288). — Banya South Is, 18.11.1991, 27 m : 1 ov. ♀ 4.0 mm (MNHN-Ga 3289).
Loyalty Islands. MUSORSTOM 6 : stn 441, 80 m : 1 ov. ♀ 4.8 mm (MNHN-Ga 2812).
Chesterfield Islands. CHALCAL 1 : stn 29, 100 m : 1 ♂ 6.2 mm (USNM).
CORAIL 2 : stn 7, 63-64 m : 1 ♂ 4.1 mm (USNM).

TYPES. — One ovigerous female (4.8 mm) from MUSORSTOM 6, Stn 441 (MNHN-Ga 2812) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *leptosyne*, thinness, in reference to the small size of the species. The name is considered as a substantive in apposition.

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. External orbital spine developed, rather mesial to level of lateral margins of carapace. Branchial margin with 4 spines. Fourth thoracic sternite with several short arcuate striae; fifth to seventh sternites smooth; lateral parts of seventh sternite with numerous granules. Second abdominal segment with a row of 4 pairs of spines on anterior ridge. Second and third segments each with one transverse stria. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) exceeding cornea, distomesial spine slightly longer than distolateral. First segment of antennal peduncle with distomesial spine reaching end second segment; distomesial spine on second segment nearly reaching end of third segment. Extensor border of merus of third maxilliped with small distal spine. Fixed and movable fingers of cheliped with a row of spines along entire lateral and mesial border, respectively. Dactylus of walking legs slightly shorter than propodus, with movable spinules along entire ventral margin.

REMARKS. — *M. leptosyne* resembles *M. evarne* Macpherson & de Saint Laurent, 1991, from French Polynesia (MACPHERSON & DE SAINT LAURENT, 1991). They differ in several aspects :

— The new species has the second abdominal segment with a row of 4 pairs of spines on the anterior ridge; only two small median spines in *M. evarne*.

— The antennular peduncle distinctly exceeds the eyes in *M. leptosyne*, whereas in *M. evarne* ends at the same level.

Source : MNHN, Paris

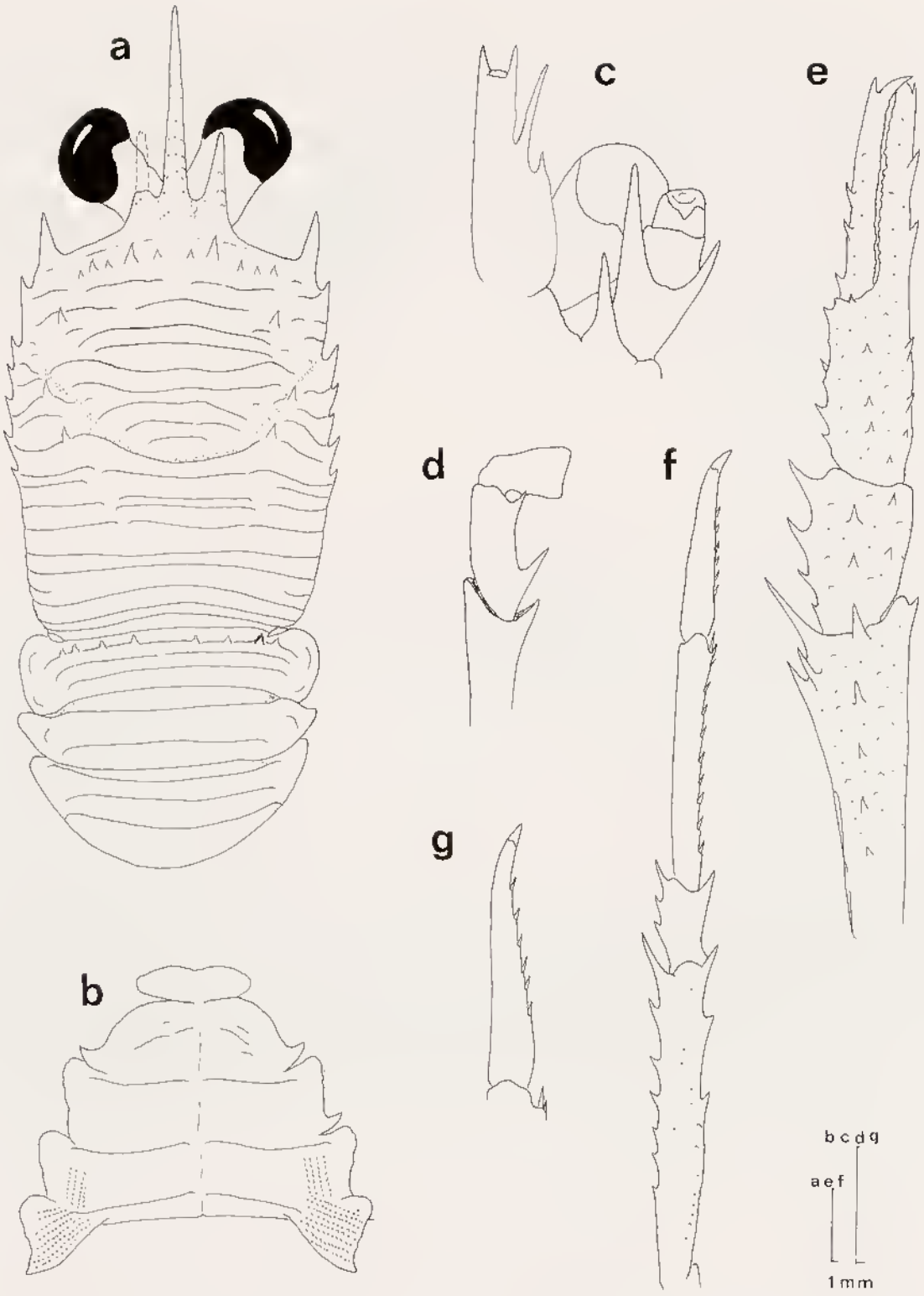

FIG. 29. — *Munida lineola* sp. nov., ♂ 5.0 mm, holotype from Saint Vincent Bay : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

M. leptosyne is also close to *M. gordoae* sp. nov. from New Caledonia, Loyalty Islands, Matthew and Hunter Islands and Chesterfield Islands, but they are easily differentiable by the size of the distal spines on the basal antennular segment. *M. leptosyne* has the distomesial spine longer than the distolateral, whereas in *M. gordoae* it is shorter. Furthermore, the basal antennular segment is distinctly longer in *M. gordoae* than in *M. leptosyne* .

SIZE.— The males examined ranged between 4.1 and 6.2 mm; females between 4.0 and 5.3 mm; ovigerous females from 4.0 mm.

DISTRIBUTION. — Loyalty Islands and Chesterfield Islands, between 6 and 100 m.

Munida leviantennata Baba, 1988

Munida leviantennata Baba, 1988 : 82 (key), 111, figs 41, 42.

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 1 : stn 50, 415-510 m : 13 ♂ 7.6 to 12.0 mm; 4 ov. ♀ 9.0 to 11.1 mm; 1 ♀ 9.8 mm (MNHN-Ga 2814).

Indonesia. CORINDON 2 : stn 229, 411-445 m : 3 ♂ 10.6 to 10.9 mm (MNHN-Ga 2815).

New Caledonia. "*Vauban*" : 22°32.3'S, 166°25.8'E, 350-420 m, 06.06.1979 : 2 ♀ 12.7 and 16.0 mm (MNHN-Ga 2816).

BIOCAL : stn 109, 495-515 m : 1 ♂ 16.0 mm; 1 ov. ♀ 12.9 mm (MNHN-Ga 2817).

MUSORSTOM 4 : stn 236, 495-550 m : 3 ♂ 9.0 to 11.0 mm; 3 ov. ♀ 9.5 to 11.0 mm (USNM). — Stn 239, 470-475 m : 1 ♂ 13.8 mm (MNHN-Ga 2819). — Stn 241, 470-480 m : 2 ♂ 9.5 and 13.0 mm; 2 ov. ♀ 9.7 and 11.9 mm; 2 ♀ 8.4 and 9.5 mm (MNHN-Ga 2820). — Stn 246, 410-420 m : 1 ♀ 13.0 mm (MNHN-Ga 2822). — Stn 247, 435-460 m : 1 ♂ 14.5 mm; 1 ov. ♀ 13.0 mm (MNHN-Ga 2823).

LAGON : stn 1062, 300-320 m : 1 ♀ 11.9 mm (MNHN-Ga 2824).

Chesterfield Islands. MUSORSTOM 5 : stn 387, 560-660 m : 2 ♂ 10.4 and 13.3 mm (USNM).

REMARKS. — The specimens examined agree quite well with the original description and figures provided by BABA (1988). The number of cardiac spines ranges between 2 and 4, sometimes one hepatic spine is present on each side (absent in the holotype). The supraocular spines (broken in the holotype) are divergent and distinctly overreach the cornea. The thoracic sternites are smooth, without striae, the fourth sternite is anterior-mesially hollowed. The males have 2 pairs of gonopods.

SIZE. — The males examined ranged between 7.6 and 16.0 mm, females between 8.4 and 16.0 mm; ovigerous females from 9.0 mm.

DISTRIBUTION. — Philippines, Indonesia, New Caledonia and Chesterfield Islands, between 300 and 660 m.

Munida lineola sp. nov.

Fig. 29

MATERIAL EXAMINED. — **New Caledonia**. Saint Vincent Bay : stn 190, 22°02'S, 165°57'E, 135-150 m : 1 ♂ 5.0 mm, holotype (MNHN-Ga 3215).

ETYMOLOGY. — From the Latin, *lineola*, line, in reference to the lines of granules on the thoracic sternites.

DESCRIPTION . — Carapace with few secondary striae. Intestinal region without scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few arcuate striae; fifth to seventh sternites smooth; lateral parts of sixth sternite with several vertical rows of small granules; lateral parts of seventh sternite with numerous granules. Second abdominal tergite with a row of 4 pairs of spines on anterior ridge. Second and third segments each with 2 and 1 transverse striae, respectively. Two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule

Source : MNHN, Paris

(distal spines excluded) distinctly exceeding cornea, distal spines subequal. First segment of antennal peduncle with distomesial spine slightly exceeding second segment; distomesial spine on second segment exceeding antennal peduncle. Extensor border of merus of third maxilliped unarmed. Fixed and movable fingers of cheliped with a row of spines along lateral and mesial border, respectively. Dactylus of walking legs slightly shorter than propodus, with movable spinules along nearly entire ventral margin.

REMARKS. — *M. lineola* is closely related to *M. pontoporea* sp. nov. from New Caledonia, but they differ in several features (see below under the Remarks of *M. pontoporea*).

The new species is also close to *M. pasithea* Macpherson & de Saint Laurent, 1991 from French Polynesia. (MACPHERSON & DE SAINT LAURENT, 1991). They are easily differentiable by the granulation of the lateral parts of the sixth thoracic sternite. In the new species the granules are scarce and disposed in rows, whereas in *M. pasithea* the granules are numerous and homogeneously disposed.

DISTRIBUTION. — New Caledonia, between 135 and 150 m.

Munida marini sp. nov.
Figs 30, 77

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 67, 500-510 m : 5 ♂ 18.3 to 25.5 mm; 6 ov. ♀ 19.7 to 24.0 mm; 2 ♀ 14.0 to 14.5 mm (MNHN-Ga 2830, 2831 and USNM).

CHALCAL 2 : stn 1, 500 m : 22 ♂ 13.6 to 26.8 mm; 9 ov. ♀ 19.0 to 23.4 mm; 9 ♀ 19.4 to 22.6 mm (MNHN Ga-2842). — Stn 2, 500 m : 11 ♂ 7.8 to 24.7 mm; 6 ov. ♀ 21.4 to 25.0 mm; 3 ♀ 7.7 to 23.2 mm (MNHN-Ga 2843 and USNM). — Stn 21, 500 m : 1 ♂ 24.5 mm; 1 ov. ♀ 22.4 mm; 2 ♀ 22.0 and 24.2 mm (MNHN-Ga 2844). — Stn 75, 600 m : 1 ♀ 17.7 mm (MNHN-Ga 2845).

SMIB 4 : stn 34, 515 m : 1 ♂ 16.2 mm; 1 ov. ♀ 18.6 mm (MNHN-Ga 2854). — Stn 38, 510 m : 1 ov. ♀ 21.6 mm (MNHN-Ga 2855).

Loyalty Islands. MUSORSTOM 6 : stn 413, 463 m : 1 ♂ 11.8 mm; 1 ov. ♀ 11.6 mm (MNHN-Ga 2850).

Chesterfield Islands. MUSORSTOM 5 : stn 388, 500-510 m : 1 ♀ 6.5 mm (MNHN-Ga 2856).

CORAIL 2 : stn 16, 500 m : 3 ♀ 7.4 to 8.6 mm (MNHN-Ga 2846). — Stn 17, 500 m : 1 ♂ 9.0 mm (MNHN-Ga 2847).

TYPES. — One ovigerous female of 20.9 mm from BIOCAL, Stn 67 (MNHN-Ga 2830) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to Marin MANRIQUEZ from the Instituto de Ciencias del Mar, Barcelona, for his continuous support in my work.

DESCRIPTION . — Carapace with two epigastric spines directly behind supraocular spines. Three longitudinal rows of spines. Median row of 6 spines : first two on median mesogastric region; third to fifth on cardiac region, sixth spine on posterior transverse ridge. Lateral rows each of 2-4 spines on branchiocardiac boundary. External orbital spine long, situated at anterolateral angle of carapace. Branchial margin with 3 spines, third spine very small or absent. Pterygostomian region with dense and iridiscent long setae. Fourth thoracic sternite with several short arcuate striae; fifth to seventh sternites without striae. Second, third and fourth abdominal segments each with 4 equal-sized spines on anterior transverse ridge; posterior ridge of fourth segment with strong median spine. One pair of gonopods on abdominal segments. Eye moderately large, maximum corneal diameter more than 1/3 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment (distal spines excluded) not exceeding cornea, distolateral spine longer than distomesial. Distomesial prolongation of first antennal segment well developed, nearly reaching rostral tip; distomesial spine on second segment reaching end of third segment, with small spine on its base; third segment with small distolateral spine. Merus of third maxilliped with marginal spine near midlength of flexor margin; small distal spine on extensor border. Fixed finger of cheliped bifid distally, movable finger with small spine near tip. Dactylus of walking legs slightly less than 1/2 propodus length, without spinules on ventral border.

Source : MNHN, Paris

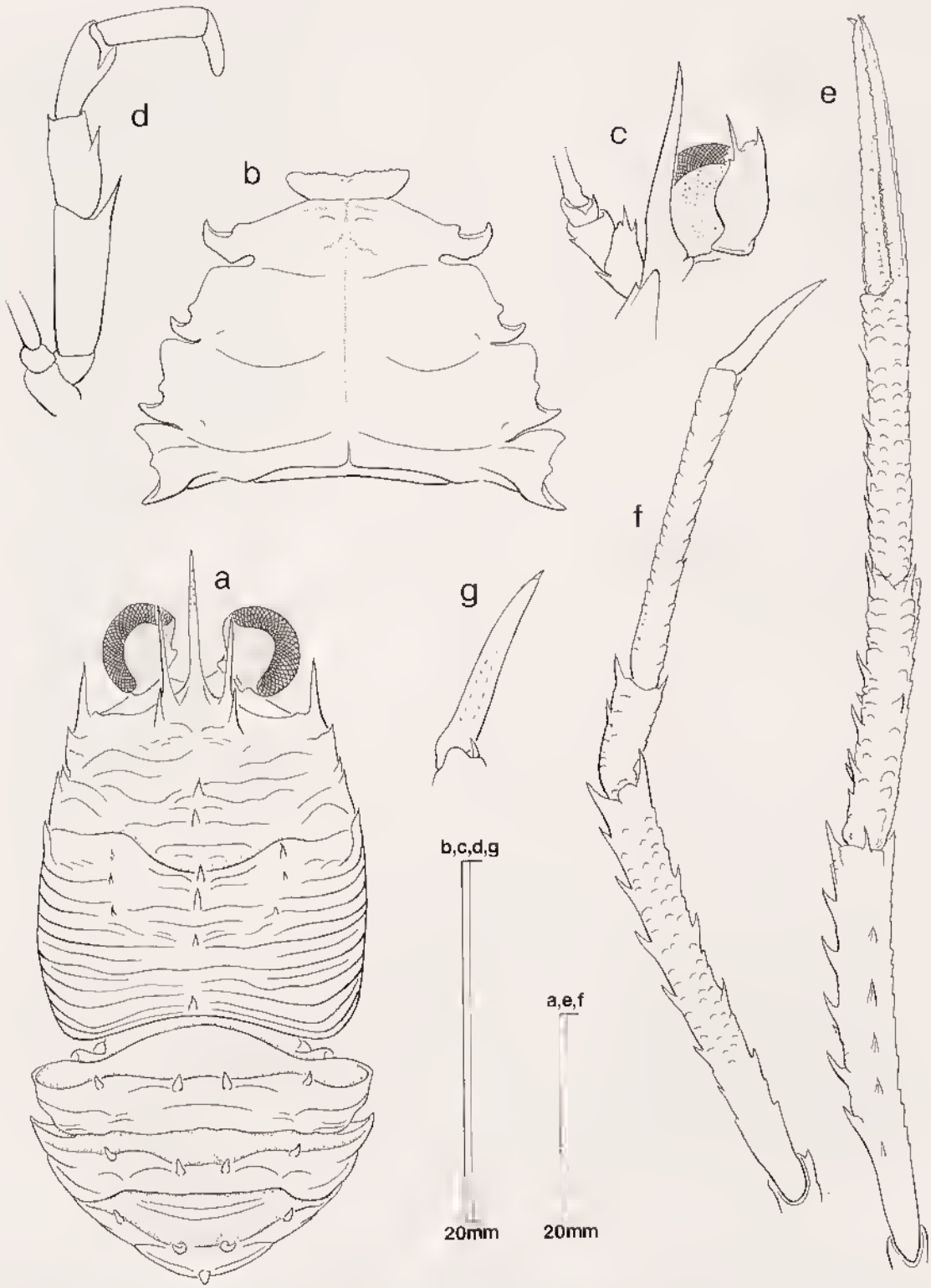

FIG. 30. — *Munida marini* sp. nov., ♀ 20.9 mm, holotype from Stn 67 (BIOCAL) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

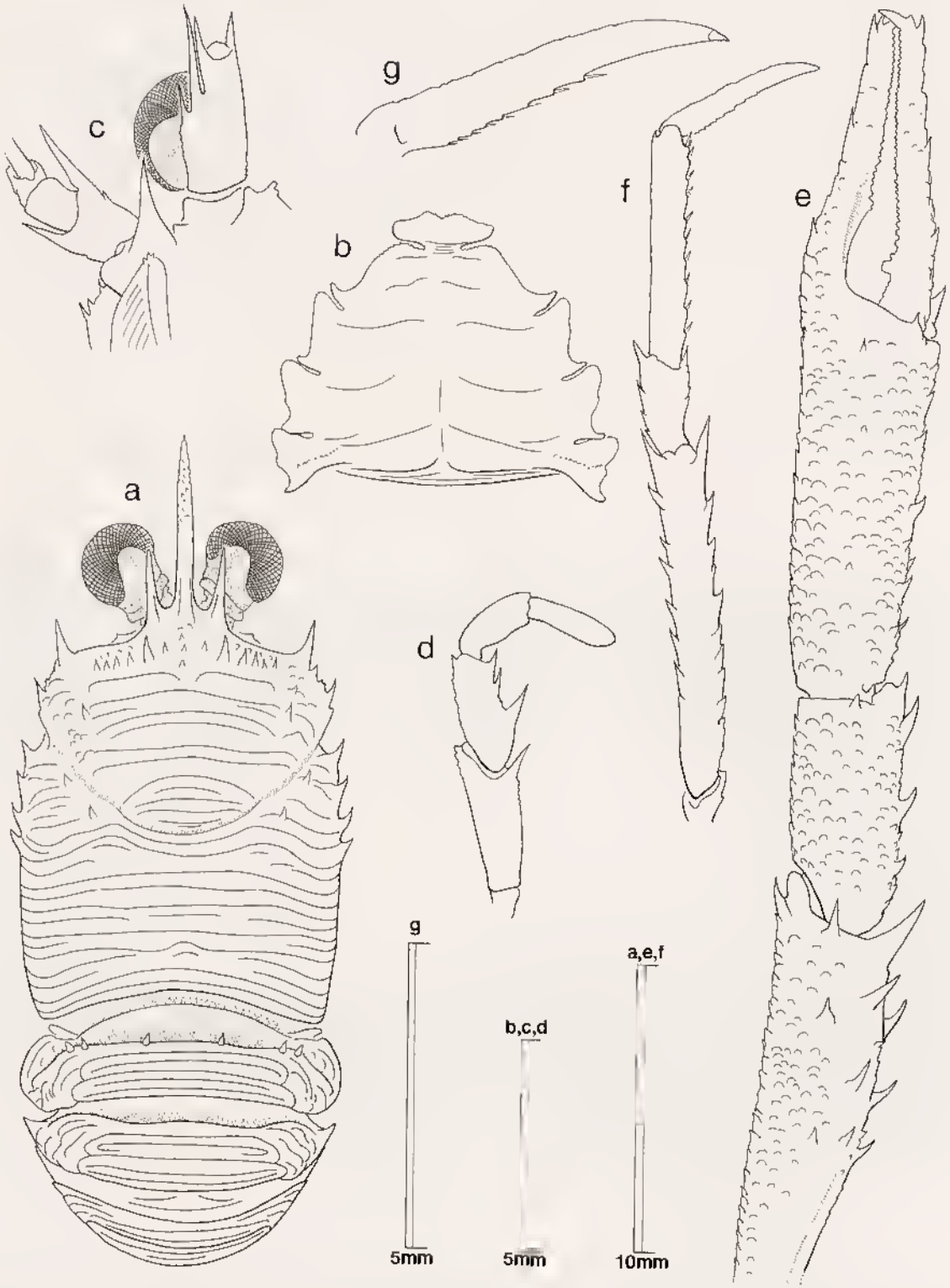

FIG. 31. — *Munida masi* sp. nov., ♂ 10.6 mm, holotype from Stn 173 (MUSORSTOM 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

COLOUR. — Ground colour of carapace and abdomen orange, supraocular spines red; epigastric region dark orange. Chelipeds and walking legs with transverse whitish and red bands; distal part of fingers of chelipeds whitish, proximal part red; dactylus of walking legs whitish.

REMARKS. — *Munida marini* is closely related to *M. eminens* Baba, 1988, from the Philippines, Indonesia, New Caledonia, Loyalty Islands and Chesterfield Islands (BABA, 1988, see also above). However, both species differ in the following aspects :

— *M. marini* has 2 median spines on mesogastric region, absent in *M. eminens*.

— The cardiac region bears 3 spines in the midline in *M. marini*, whereas there are only 1-2 spines in *M. eminens*.

— The posterior margin of the carapace has 2 spines in *M. eminens*, only one in *M. marini*.

— The second antennal segment has one additional mesial spine, proximal to the distal spine in *M. marini*, which is absent in *M. eminens*.

— The extensor margin of the merus of the third maxilliped has one distal spine in *M. marini*, but is unarmed in *M. eminens*.

M. marini is also close to *M. callirrhoe* sp. nov. from New Caledonia, Chesterfield Islands and Loyalty Islands. They differ in the following aspects :

— *M. callirhoe* has one mesogastric spine, whereas *M. marini* has 2 spines.

— The thoracic sternites have numerous arcuate striae in *M. callirrhoe*; these striae are practically absent in *M. marini*.

— The distomesial spine on the basal antennular segment is longer than the distolateral in *M. callirrhoe*, but is shorter in *M. marini*.

— The distomesial spine on the second antennal segment reaches the end of the peduncle in *M. callirrhoe*, but only the end of the second segment in *M. marini*.

— The dactylus of the walking legs are longer and more slender in *M. callirrhoe* than in *M. marini*.

— The colour pattern is different in both species (see Figs 77 and 91).

SIZE. — The males examined ranged between 7.8 mm and 26.8 mm, females between 6.5 and 25.0 mm; ovigerous females from 11.6 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Chesterfield Islands, between 463 and 600 m.

Munida masi sp. nov.

Fig. 31

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 173, 250-290 m : 1 ♂ 10.6 mm, holotype (MNHN-Ga 2857).

ETYMOLOGY. — This species is dedicated to J. MAS, of the Instituto de Ciencias del Mar, Barcelona, for his contribution to the biology of marine organisms.

DESCRIPTION. — Carapace with secondary striae between principal striae. Posteriormost stria of carapace not interrupted, medially arcuate. Intestinal region with one scale. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines quite similar in size. Fourth thoracic sternite with few short arcuate striae; fifth to seventh smooth. Second abdominal segment with a row of 3 pairs of spines on anterior ridge. Second and third abdominal segments each with some transverse striae. Two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) slightly exceeding cornea, with 2 long subequal distal spines. First segment of antennal peduncle with distomesial spine reaching end of second segment; distomesial spine on second segment exceeding antennal peduncle. Extensor margin of merus of third maxilliped with distal spine. Movable and fixed fingers of cheliped

Source : MNHN, Paris

with a row of spines along mesial and lateral margins, respectively. Dactylus of walking legs 2/3 propodus length, with movable spinules along proximal 2/3 of ventral margin.

REMARKS. — *M. masi* resembles *M. albiapicula* Baba & Yu, 1987, from Taiwan (BABA & YU, 1987). The two species differ in several features :

— The fixed and movable fingers of the cheliped only have one proximal spine other than subterminals in *M. albiapicula*, whereas there are one additional on fixed finger and two on the movable finger in *M. masi*.

— The dactylus of the walking legs has the spinelets restricted to the proximal 2/3 of the ventral border in *M. masi*, whereas these spinelets are present along the entire ventral border in *M. albiapicula* .

M. masi is also close to *M. psamathe* sp. nov. from New Caledonia, Matthew and Hunter Islands (see Remarks under that species).

DISTRIBUTION. — New Caledonia, between 250 and 290 m.

Munida microps Alcock, 1894

Fig. 32

Munida microps - BABA, 1988 : 84 (key), 122 (references and synonymies).

MATERIAL EXAMINED. — **Philippines**. MUSORSTOM 2 : stn 56, 970 m : 2 ♂ 14.4 and 15.7 mm (MNHN-Ga 2858, 3491).

New Caledonia. BIOCAL : stn 61, 1070 m : 2 ♂ 7.0 and 7.6 mm (USNM).

BIOGEOCAL : stn 297, 1230-1240 m : 1 ♀ 10.0 mm (MNHN-Ga 3290).

Chesterfield Islands. MUSORSTOM 5 : stn 323, 970 m : 9 ♂ 9.4 to 14.2 mm; 3 ov. ♀ 11.2 to 11.6 mm; 5 ♀ 7.3 to 9.4 mm (MNHN-Ga 2860). — Stn 324, 970 m : 8 ♂ 8.0 to 13.8 mm; 7 ov. ♀ 8.7 to 13.2 mm; 7 ♀ 8.7 to 11.2 mm (MNHN-Ga 2861).

REMARKS. — *Munida microps* was described from specimens collected in the Andaman Sea. The species was posteriously cited in the Arabian Sea, Maldives Islands, off Colombo, Sulawesi and southeastern Australia, between 686 and 1234 m (e.g., ALCOCK, 1901; TIRMIZI, 1966; HAIG, 1974; BABA, 1988). Furthermore, BABA (1988) consider that *M. microps* and *M. microps* var. *lasiocheles* Alcock, 1894, are the same species. The species is characterized by the presence of 5 spines on the branchial margin, some spines on the second abdominal segment, the lateral parts of the seventh thoracic sternites smooth, the cornea scarcely broader than the stalk, the antennular peduncle distinctly exceeding cornea, the distomesial spine on the basal antennular segment smaller than the distolateral, the fixed finger of cheliped only with one spine in addition to subterminal spines and the dactylus of the walking legs with spines along the entire ventral border.

Unfortunatly, in the present paper, I have not examined specimens from the type series or type locality. However, the specimens examined here present several differences with one male (12.0 mm) from the Maldives Islands (John Murray Expedition, Stn 158, BM) identified by TIRMIZI (1966) as *M. microps*. For instance, the cornea of the male from Maldives is smaller and the basal antennular segment much longer than in the present material. These differences, of specific value in species of the genus *Munida*, recommend a comparison of the type series with specimens from the different localities in order to clarify the status of this species.

The colour of the specimens collected in New Caledonia is light pinkish, darker in the gastric region and tips of the fingers of cheliped and dactylus of the walking legs.

The present material was collected in the Philippines, New Caledonia and Chesterfield Islands, between 970 and 1240 m.

Munida militaris Henderson, 1885

Munida militaris - BABA & MACPHERSON, 1991 : 539 (references and synonymies).

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn 168, 720 m : 1 ♂ 14.0 mm (MNHN-Ga 2862).

Source : MNHN, Paris

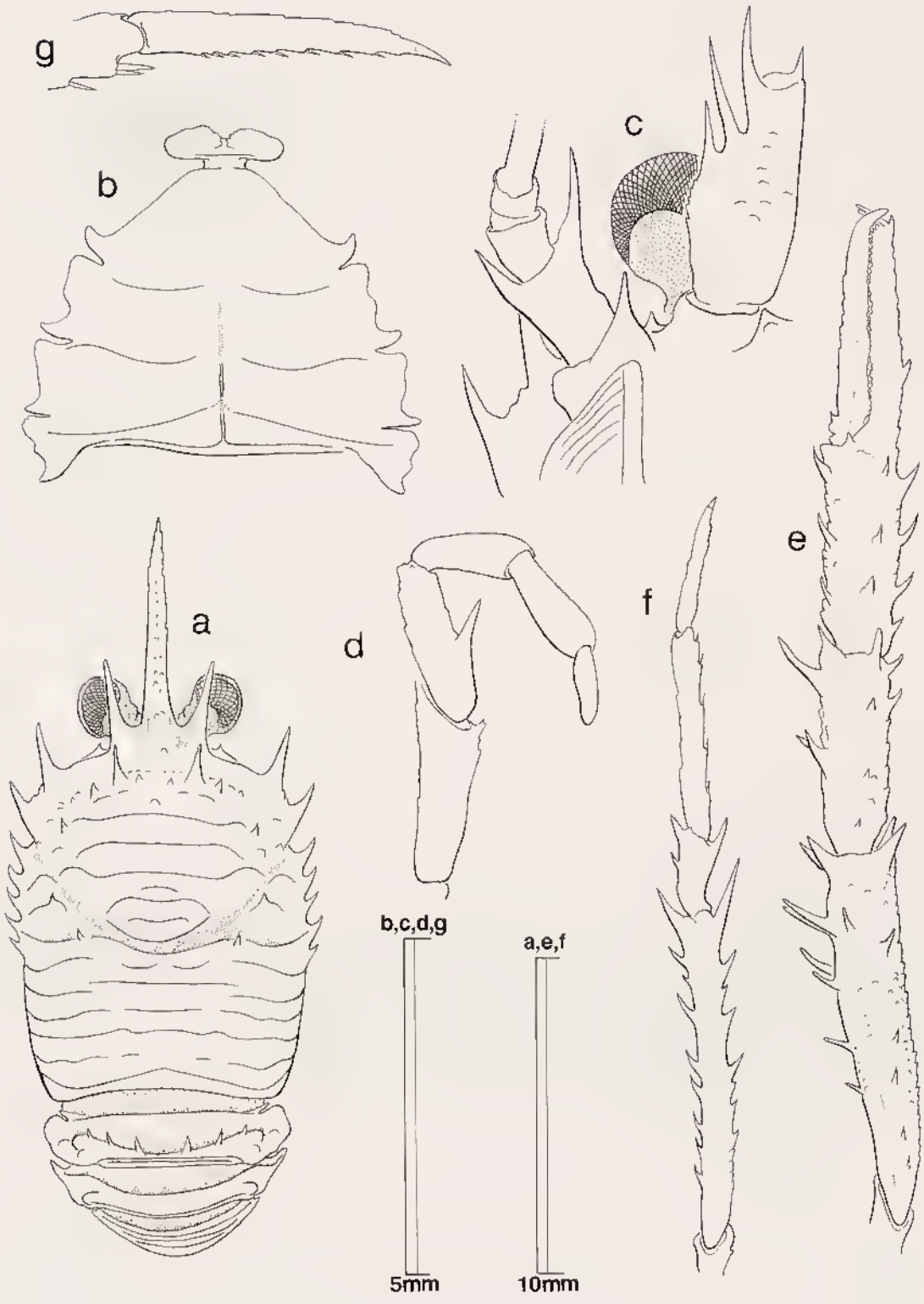

FIG. 32. — *Munida microps* Alcock, 1894, ♂ 10.4 mm, from Stn 323 (MUSORSTOM 5) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

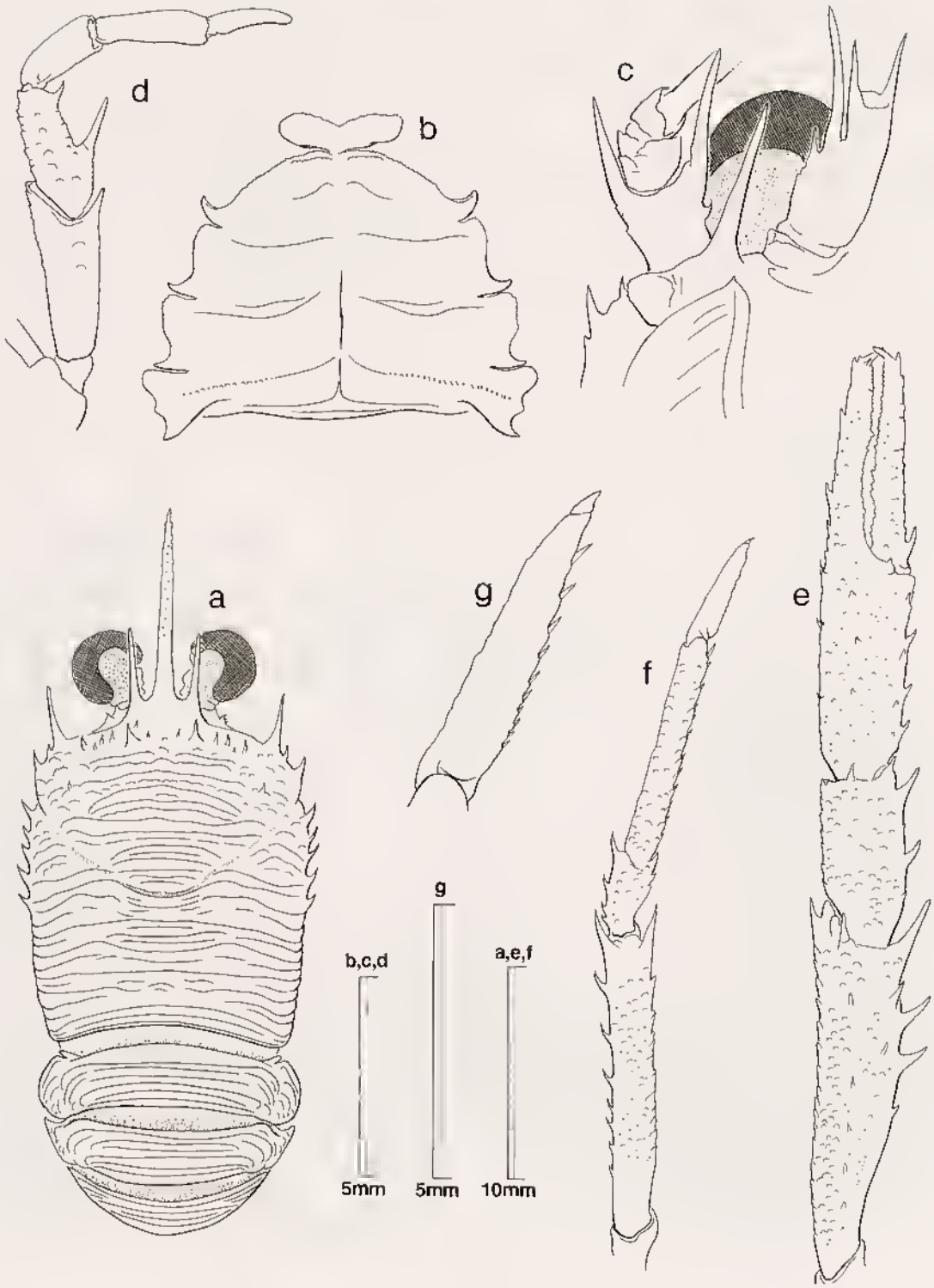

FIG. 33. — *Munida moliae* sp. nov., ♂ 13.6 mm, holotype from Stn 156 (MUSORSTOM 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

REMARKS. — The specimen from New Caledonia agrees quite well with the type material (see BABA & MACPHERSON, 1991). The closest species in the area is *M. eclepsis* sp. nov. from New Caledonia, but they differ in several characters :

— The distomesial spine on the second antennal segment distinctly exceeds the antennal peduncle in *M. eclepsis*, whereas this spine is shorter and never reaches the end of the peduncle in *M. militaris*.

— The fixed finger of cheliped of *M. militaris* has only one basal spine in addition to the subterminal spines. In the new species the lateral margin has a row of spines.

DISTRIBUTION. — The species is previously known from Indonesia and Fiji, between 183 and 576 m.

Munida moliae sp. nov.

Fig. 33

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn 155, 500-570 m : 11 ♂ 8.0 to 21.0 mm; 7 ov. ♀ 10.0 to 16.4 mm; 2 ♀ 9.0 and 9.6 mm (MNHN-Ga 3291). — Stn 156, 530 m : 4 ♂ 5.0 to 21.0 mm; 2 ov. ♀ 12.6 and 14.7 mm; 3 ♀ 4.4 to 8.8 mm (MNHN-Ga 2863, 2864). — Stn 162, 535 m : 3 ♂ 12.8 to 16.4 mm; 3 ov. ♀ 11.4 to 13.7 mm; 1 ♀ 10.8 mm (USNM). — Stn 167, 575 m : 4 ♀ 7.7 to 10.6 mm (MNHN-Ga 2866). — Stn 170, 485 m : 1 ♂ 10.5 mm (MNHN-Ga 2867). — Stn 180, 450 m : 5 ♂ 12.6 to 17.4 mm; 3 ov. ♀ 12.4 to 14.5 mm (MNHN-Ga 3292). — Stn 194, 545 m : 16 ♂ 8.4 to 14.2 mm; 5 ov. ♀ 9.8 to 12.6 mm; 9 ♀ 7.4 to 10.6 mm (MNHN-Ga 3293). — Stn 196, 460 m : 1 ♂ 12.6 mm; 1 ov. ♀ 15.4 mm; 1 ♀ 8.7 mm (MNHN-Ga 2868).

SMIB 3 : stn 3, 530 m : 1 ♂ 9.7 mm; 1 ♀ 8.4 mm (MNHN-Ga 3294).

SMIB 5 : stn 91, 335-340 m : 2 ov. ♀ 5.2 and 5.5 mm (MNHN-Ga 3295).

Loyalty Islands. MUSORSTOM 6 : stn 477, 550 m : 1 ♀ 4.0 mm (MNHN-Ga 3489). — Stn 482, 375 m : 1 ov. ♀ 8.0 mm; 1 ♀ 12.0 mm (MNHN Ga 2869).

TYPES. — One male of 13.6 mm from MUSORSTOM 4, Stn 156 (MNHN-Ga 2863) has been selected as the holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to B. MOLI, from the Instituto de Ciencias del Mar, Barcelona, for her support in my work.

DESCRIPTION. — Carapace with numerous secondary striae. Intestinal region with scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few striae; fifth to seventh smooth. Abdominal segments unarmed, with some transverse striae. Two pairs of gonopods present on first and second abdominal segments. Eye large, maximum corneal diameter more than 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) ending at same level as the cornea, distomesial spine usually longer than distolateral, occasionally subequal. First segment of antennal peduncle with long distomesial spine exceeding third segment; distomesial spine on second segment exceeding antennal peduncle. Extensor margin of merus of third maxilliped unarmed. Fixed finger of cheliped with a row of spines along lateral margin; movable finger with one basal and one distal spine on mesial margin. Dactylus of walking legs about 1/2 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. moliae* is closely related to *M. abelloi* sp. nov. from Kiribati, however they can be distinguished by several features :

— The maximum corneal diameter in *M. moliae* is more than 1/3 the length of the anterior border of the carapace between the bases of the external orbital spines; whereas this ratio is less than 1/3 in *M. abelloi*.

— The basal antennular segment not exceed the cornea in *M. moliae*, whereas this segment distinctly exceeds the eyes in *M. abelloi*.

— The movable finger of the cheliped has only one basal and one distal spine in *M. moliae*, whereas there are several spines between these two spines in *M. abelloi*.

Source : MNHN, Paris

SIZE. — The males examined ranged between 5.0 and 21.0 mm, females between 4.0 and 15.4 mm; ovigerous females from 5.2 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands, between 335 and 575 m.

Munida normani Henderson, 1885

Munida Normani Henderson, 1885 : 408.
Munida normani - HENDERSON, 1888 : 129, pl.13, fig. 5. — BABA, 1988: 83 (key).

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 198, 590 m : 1 ♀ 13.3 mm (MNHN-Ga 2871).
Fiji Islands. *"Challenger"* : stn 173, 24.07.1874, 19°09'35"S, 179°41'50"E, 583 m : 7 ♂ 9.7 to 15.0 mm; 3 ♀ 9.0 to 11.7 mm; 1 juv. 7.6 mm (BM).

REMARKS. — The specimen collected in New Caledonia agrees quite well with the types. However, one of the specimens of the type series, a juvenile, is somewhat different from the remainder : the spines on the posterior transverse ridge of the carapace are absent; the branchiocardiac boundary bears 3 spines instead of 5 as in the other types; also the cardiac region is unarmed instead of bearing 3-5 spines as in the remainder.

SIZE. — The males examined (including the type series) ranged between 9.7 and 15.0 mm; females between 9.0 and 13.3 mm.

DISTRIBUTION. — Fiji Island and New Caledonia, between 583 and 590 m.

Munida notata sp. nov.

Figs 34, 78

MATERIAL EXAMINED. — **New Caledonia.** LAGON : stn 387, 318 m : 5 ♂ 6.0 to 6.5 mm; 4 ov. ♀ 6.3 to 8.3 mm (MNHN-Ga 3310). — Stn 418, 318 m : 1 ♂ 6.9 mm (MNHN-Ga 3309). — Stn 1152, 335 m : 2 ♂ 7.8 and 8.7 mm; 4 ov. ♀ 7.0 to 9.0 mm; 3 ♀ 4.7 to 5.5 mm (MNHN-Ga 3311).

BIOCAL : stn 84, 150-210 m : 2 ov. ♀ 10.0 and 10.2 mm (MNHN-Ga 3296). — Stn 108, 335 m : 6 ♂ 5.7 to 7.7 mm; 4 ov. ♀ 5.6 to 7.8 mm (MNHN-Ga 2872). — Stn 105, 335 m : 4 ♂ 7.6 to 9.8 mm; 1 ♀ 5.6 mm (MNHN-Ga 3297). — Stn 110, 275 m : 1 ♂ 6.5 mm; 4 ov. ♀ 7.0 to 11.0 mm (MNHN-Ga 2873).

MUSORSTOM 4 : stn 148, 59 m : 8 ♂ 5.7 to 10.5 mm; 5 ov. ♀ 6.5 to 8.6 mm; 1 ♀ 7.9 mm (MNHN-Ga 3298). — Stn 172, 275-330 m : 14 ♂ 6.1 to 11.8 mm; 6 ov. ♀ 9.0 to 9.5 mm; 2 ♀ 5.0 and 7.3 mm (MNHN-Ga 3299). — Stn 178, 520 m : 1 ♀ 4.8 mm (MNHN-Ga 2874). — Stn 183, 280 m : 19 ♂ 6.0 to 10.5 mm; 13 ov. ♀ 6.4 to 8.8 mm; 2 ♀ 7.8 and 8.4 mm (MNHN-Ga 2875 and USNM). — Stn 184, 260 m : 1 ov. ♀ 6.4 mm (MNHN-Ga 3300). — Stn 210, 340-345 m : 1 ♂ 5.1 mm; 1 ♀ 4.8 mm (MNHN-Ga 3301). — Stn 226, 395 m : 3 ♂ 4.2 to 7.2 mm; 2 ov. ♀ 8.4 and 9.0 mm; 1 ♀ 4.5 mm (MNHN-Ga 2876). — Stn 227, 320 m : 4 ♂ 7.5 to 9.0 mm; 1 ov. ♀ 7.0 mm (MNHN-Ga 2877). — Stn 234, 350-365 m : 1 ov. ♀ 11.7 mm (MNHN-Ga 3302). — Stn 235, 405-415 m : 1 ♂ 8.0 mm (MNHN-Ga 2878).

Station without number : 22°40'S, 167°10'E, 200-350 m, 10.10.1986 : 5 ♂ 5.7 to 7.7 mm (MNHN-Ga 2879).

CHALCAL 2 : stn 69, 260 m : 2 ov. ♀ 5.3 and 5.6 mm (MNHN-Ga 3479). — Stn 83, 200 m : 1 ov. ♀ 7.3 mm (MNHN-Ga 2880).

SMIB 5 : stn 91, 335-340 m : 1 ♀ 8.5 mm (MNHN-Ga 3307). — Stn 94, 275 m : 2 ♂ 5.0 and 9.8 mm; 1 ♀ 8.5 mm (MNHN-Ga 3308).

SMIB 6 : stn 116, 290-300 m : 1 ov. ♀ 8.8 mm (MNHN-Ga 2887). — Stn 120, 310-325 m : 1 ♂ 6.3 mm (MNHN-Ga 2888). — Stn 124, 360-405 m : 1 ♀ 7.0 mm (MNHN-Ga 2889). — Stn 125, 335-350 m : 1 ♂ 8.0 mm; 2 ov. ♀ 8.5 and 9.3 mm (MNHN-Ga 2890). — Stn 126, 320-330 m : 2 ♂ 8.4 and 8.7 mm; 1 ♀ 7.2 mm (MNHN-Ga 2891).

Loyalty Islands. MUSORSTOM 6 : stn 397, 380 m : 1 ♂ 8.3 mm (MNHN-Ga 3466). — Stn 398, 370 m : 4 ♂ 9.2 to 10.1 mm; 3 ov. ♀ 9.0 to 9.5 mm (MNHN-Ga 3306). — Stn 399, 282 m : 5 ♂ 7.8 to 10.2 mm; 1 ov. ♀ 9.4 mm (MNHN-Ga 2882, 2647). — Stn 406, 373 m : 2 ♂ 6.9 and 9.4 mm (MNHN-Ga 3305). — Stn 417, 283 m : 1 ♂ 10.2 mm (MNHN-Ga 3485). — Stn 419, 283 m : 5 ♂ 9.2 to 13.4 mm; 3 ♀ 5.0 to 8.8 mm (MNHN-Ga 2883). — Stn 457, 353 m : 1 ov. ♀ 9.6 mm (MNHN-Ga 2884). — Stn 474, 260 m : 1 ov. ♀ 11.7 mm (MNHN-Ga 3449). — Stn 477, 550 m : 1 ♀ 4.1 mm (MNHN-Ga 2885). — Stn 481, 300 m : 2 ♂ 8.8 and 10.7 mm; 1 ov. ♀ 9.7 mm (MNHN-Ga 2886).

Chesterfield Islands. CHALCAL 1 : stn 3, 120-150 m : 2 ov. ♀ 7.0 and 8.9 mm (MNHN-Ga 2892). — Stn 5, 400 m : 1 ov. ♀ 8.4 mm (MNHN-Ga 2893). — Stn 14, 246 m : 1 ♂ 6.6 mm; 1 ov. ♀ 7.6 mm (MNHN-Ga 2894). —

Source : MNHN, Paris

Stn 31, 230 m : 2 ♂ 5.8 and 6.7 mm; 3 ov. ♀ 6.8 to 8.3 mm (MNHN-Ga 2895). — Stn 32, 350 m : 1 ♀ 8.7 mm (MNHN-Ga 2896). — Stn 35, 210 m : 1 ov. ♀ 5.8 mm (MNHN-Ga 3484).

MUSORSTOM 5 : stn 250, 850 m : 2 ♂ 5.6 and 5.7 mm; 3 ov. ♀ 5.3 to 7.0 mm; 1 ♀ 7.2 mm (MNHN-Ga 2897). — Stn 255, 280-295 m : 1 ov. ♀ 5.3 mm (MNHN-Ga 2898). — Stn 263, 150-225 m : 2 ov. ♀ 6.7 and 7.3 mm (MNHN-Ga 3480). — Stn 268, 280 m : 2 ♂ 5.4 and 5.5 mm; 1 ov. ♀ 4.5 mm (MNHN-Ga 2899). — Stn 269, 250-270 m : 1 ♂ 4.3 mm (MNHN-Ga 2900). — Stn 276, 258-269 m : 1 ♂ 7.2 mm (MNHN-Ga 3474). — Stn 288, 270 m : 1 ov. ♀ 7.0 mm (MNHN-Ga 3486). — Stn 289, 273 m : 1 ♂ 6.1 mm; 3 ov. ♀ 5.5 to 8.0 mm (MNHN-Ga 2901). — Stn 300, 450 m : 2 ♂ 7.2 and 8.5 mm; 1 ov. ♀ 8.0 mm; 1 ♀ 7.8 mm (MNHN-Ga 2902). — Stn 301, 487-610 m : 1 ♂ 3.4 mm (MNHN-Ga 2903). — Stn 304, 385-420 m : 2 ♂ 6.2 and 6.4 mm (MNHN-Ga 3467). — Stn 328, 355-340 m : 1 ov. ♀ 7.5 mm; 1 ♀ 4.2 mm (MNHN-Ga 2904). — Stn 329, 320 m : 1 ♀ 5.7 mm (MNHN-Ga 2905). — Stn 332, 400 m : 1 ♂ 9.6 mm; 3 ov. ♀ 7.6 to 9.8 mm; 2 ♀ 6.5 and 8.3 mm (MNHN-Ga 2907). — Stn 347, 245-252 m : 1 ♂ 9.0 mm; 1 ov. ♀ 7.7 mm (MNHN-Ga 3475). — Stn 348, 260 m : 1 ♂ 5.8 mm (MNHN-Ga 2906). — Stn 349, 275 m : 1 ♂ 4.2 mm (MNHN-Ga 2908). — Stn 353, 290 m : 1 ♂ 5.0 mm (MNHN-Ga 3497). — Stn 361, 400 m : 5 ♂ 5.2 to 6.0 mm; 1 ov. ♀ 7.2 mm; 1 ♀ 4.6 mm (MNHN-Ga 3404). — Stn 362, 410 m : 1 ov. ♀ 6.0 mm (MNHN-Ga 3482). — Stn 375, 300 m : 4 ♂ 5.1 to 8.0 mm; 4 ov. ♀ 6.3 to 8.0 mm (MNHN-Ga 2909). — Stn 377, 260-270 m : 2 ov. ♀ 6.1 and 6.7 mm; 1 ♀ 6.0 mm (MNHN-Ga 3491).

CORAIL 2 : stn 114, 217 m : 1 ♂ 5.3 mm; 1 ov. ♀ 4.7 mm (MNHN-Ga 3303). — Stn 129, 215 m : 1 ♂ 8.3 mm (MNHN-Ga 3304). — Stn 131, 215-217 m : 16 ♂ 5.5 to 8.8 mm; 12 ov. ♀ 6.0 to 8.3 mm; 2 ♀ 8.5 and 8.6 mm (MNHN-Ga 2881).

TYPES. — The ovigerous female of 9.4 mm from MUSORSTOM 6, Stn 399 (MNHN-Ga 2882) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Latin, *notatio*, marking, in reference to the spots on the carapace and abdominal segments.

DESCRIPTION.— Carapace with secondary striae present. Intestinal region without scales. External orbital spine long, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth and fifth thoracic sternites with few short arcuate striae; sixth and seventh sternites smooth. Second abdominal segment usually unarmed, occasionally with 1-2 spines on each lateral side. Second and third abdominal segments each with several transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, distomesial spine longer than distolateral. First segment of antennal peduncle with long distomesial spine reaching end of third segment; distomesial spine on second segment exceeding antennal peduncle. Extensor border of merus of third maxilliped with small distal spine. Fixed and movable fingers of cheliped with a row of spines along lateral and mesial borders, respectively. Dactylus of walking legs half as long as propodus, with movable spinules along ventral margin, distal third unarmed.

COLOUR. — Ground colour of carapace and abdominal segments light orange. Large red spots scattered on dorsal surface of carapace. Striae reddish. Rostrum and supraocular spines orange. Second to fourth abdominal segments with median and lateral red spots. Chelipeds and walking legs light orange, spines and some granules reddish. Distal part of fingers of chelipeds and dactylus of walking legs white.

REMARKS. — *M. notata* is closely related to *M. acantha* sp. nov. from New Caledonia, Loyalty Islands and Aloll de Surprise, but they differ in several aspects :

— The third thoracic sternite in *M. notata* is much longer relative to width and more distinctly convex on the anterior margin than in *M. acantha*.

— *M. acantha* has the distomesial spine on the antennal basal segment exceeding the antennal peduncle, whereas this spine never exceeds the peduncle in *M. notata*.

— The dactylus of the walking legs has spines along the entire ventral border in *M. acantha*, unarmed on the terminal third in *M. notata*.

SIZE. — The males examined ranged between 3.4 and 13.4 mm, females between 4.1 and 11.7 mm; ovigerous female from 4.5 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Chesterfield Islands, between 120 and 850 m.

Source : MNHN, Paris

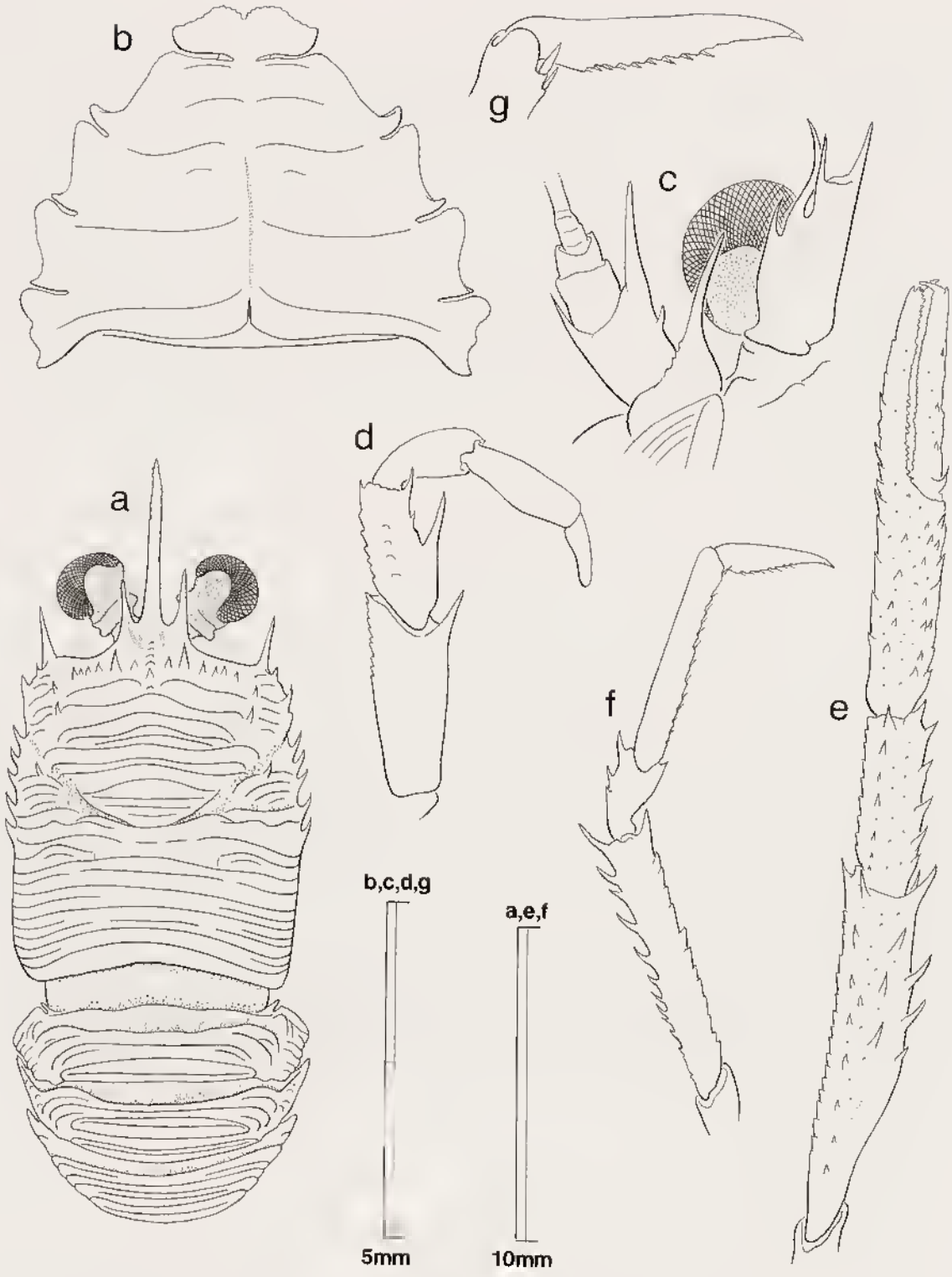

FIG. 34. — *Munida notata* sp. nov., ov. ♀ 9.4 mm, holotype from Stn 399 (MUSORSTOM 6) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing anteunular and antennal peduncles; d, right third maxilliped, lateral view; e, left cheliped, dorsal view; f, right first walking leg, lateral view; g, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

Munida ocyrhoe sp. nov.

Figs 35, 79

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 67, 500 m : 1 ♂ 28.4 mm; 1 ov. ♀ 19.8 mm; 2 ♀ 13.3 and 15.8 mm (MNHN- Ga 3313).

MUSORSTOM 4 : stn 194, 550 m : 1 ♂ 10.8 mm; 1 ♀ 12.7 mm (MNHN-Ga 3316). — Stn 198, 590 m : 1 ♀ 10.8 mm (MNHN-Ga 2756). — Stn 215, 485-520 m : 1 ♀ 24.4 mm (MNHN-Ga 3314). — Stn 216, 490-515 m : 3 ♀ 17.0 to 29.4 mm (MNHN-Ga 2758). — Stn 238, 500-510 m : 1 ♀ 25.8 mm (MNHN-Ga 2759). — Stn 240, 475-500 m : 2 ♀ 7.9 and 8.2 mm (MNHN-Ga 2910).

SMIB 2 : stn 10, 490-495 m : 3 ♂ 8.2 to 12.8 mm; 1 ov. ♀ 24,6 mm; 2 ♀ 12.2 and 15.7 mm (MNHN-Ga 2760). — Stn 26, 500-535 m : 1 ♀ 14.2 mm (USNM).

CHALCAL 2 : stn 1, 500-580 m : 2 ♂ 13.5 and 15.3 mm; 4 ov. ♀ 15.4 to 27.7 mm; 2 ♀ 9.8 and 20.0 mm (MNHN-Ga 2912 and USNM). — Stn 2, 500 m : 1 ♂ 21.0 mm; 2 ♀ 19.4 and 28.0 mm (MNHN-Ga 3317). — Stn 74, 650 m : 1 ♀ 10.5 mm (MNHN-Ga 2913).

SMIB 3 : stn 12, 470 m : 1 ov. ♀ 12.4 mm (MNHN-Ga 3315).

SMIB 4 : stn 34, 515 m : 1 ♂ 20.3 mm (MNHN-Ga 3320). — Stn 38, 510 m : 1 ♀ 16.0 mm (MNHN-Ga 3318). — Stn 39, 560 m : 1 ov. ♀ 26.4 mm (MNHN-Ga 3319). — Stn 62, 490-540 m : 1 ov. ♀ 25.0 mm (MNHN-Ga 2914).

Chesterfield Islands. MUSORSTOM 5 : stn 355, 580 m : 1 ♀ 7.6 mm (MNHN-Ga 2915).

TYPES. — One ovigerous female of 25.0 mm from SMIB 4, Stn 62, (MNHN-Ga 2914) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Oceanids of the Greek mythology (Ocyrhoë).

DESCRIPTION. — Carapace with numerous secondary striae. Intestinal region with small scales. Gastric region with 2 epigastric spines placed behind supraocular spines. Each branchiocardiac boundary with 3 spines in longitudinal row, first postcervical, well developed, second small, rather close to first, third also small, somewhat posterior to level of cardiac transverse elevation. Posterior transverse ridge armed with 2 median spines. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines. Thoracic sternites with numerous striae. Second, third and fourth abdominal segments each with 4 spines on anterior transverse ridge; posterior ridge of fourth segment unarmed. Males with gonopods absent from first abdominal segment. Eye moderately large, maximum corneal diameter 1/3 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment (distal spines excluded) not exceeding cornea, distomesial spine distinctly longer than distolateral. First antennal segment moderately produced on mesial margin, slightly exceeding second segment; distomesial spine on second segment reaching end of peduncle; third segment with distomesial spine. Extensor border of merus of third maxilliped unarmed. Fingers of cheliped distally curving and crossing; fixed finger with distal spine. Dactylus of walking legs with dorsal border slightly concave, ventral border convex, with spinules restricted to median portion.

COLOUR. — Ground colour of carapace and abdomen orange; rostrum whitish; spines on carapace and abdomen reddish. Chelipeds orange; proximal 2/3 of fingers reddish, distal third whitish. Proximal half of propodus of walking legs red, distal half whitish; dactylus whitish.

REMARKS. — *M. ocyrhoe* is closely related to *M. laurentae* sp. nov. from New Caledonia, Loyalty Islands, Matthew and Hunter Islands and Chesterfield Islands described above. They differ in several characters :

— The rostrum and the supraocular spines are more slender in *M. laurentae* than in *M. ocyrhoe*.

— The mesial spines on both the second and third antennal segments distinctly exceed the antennal peduncle in *M. laurentae*, whereas the mesial spine on the second segment reaches the end of the antennal pedunele and the spine on the third segment never exceeds the antennal peduncle in *M. ocyrhoe*.

— The merus of the third maxilliped is unarmed on the extensor margin in *M. ocyrhoe*, instead of having a distinct distal spine as in *M. laurentae*.

— The colour patterns are quite different (see Figs 78 and 91).

Source : MNHN, Paris

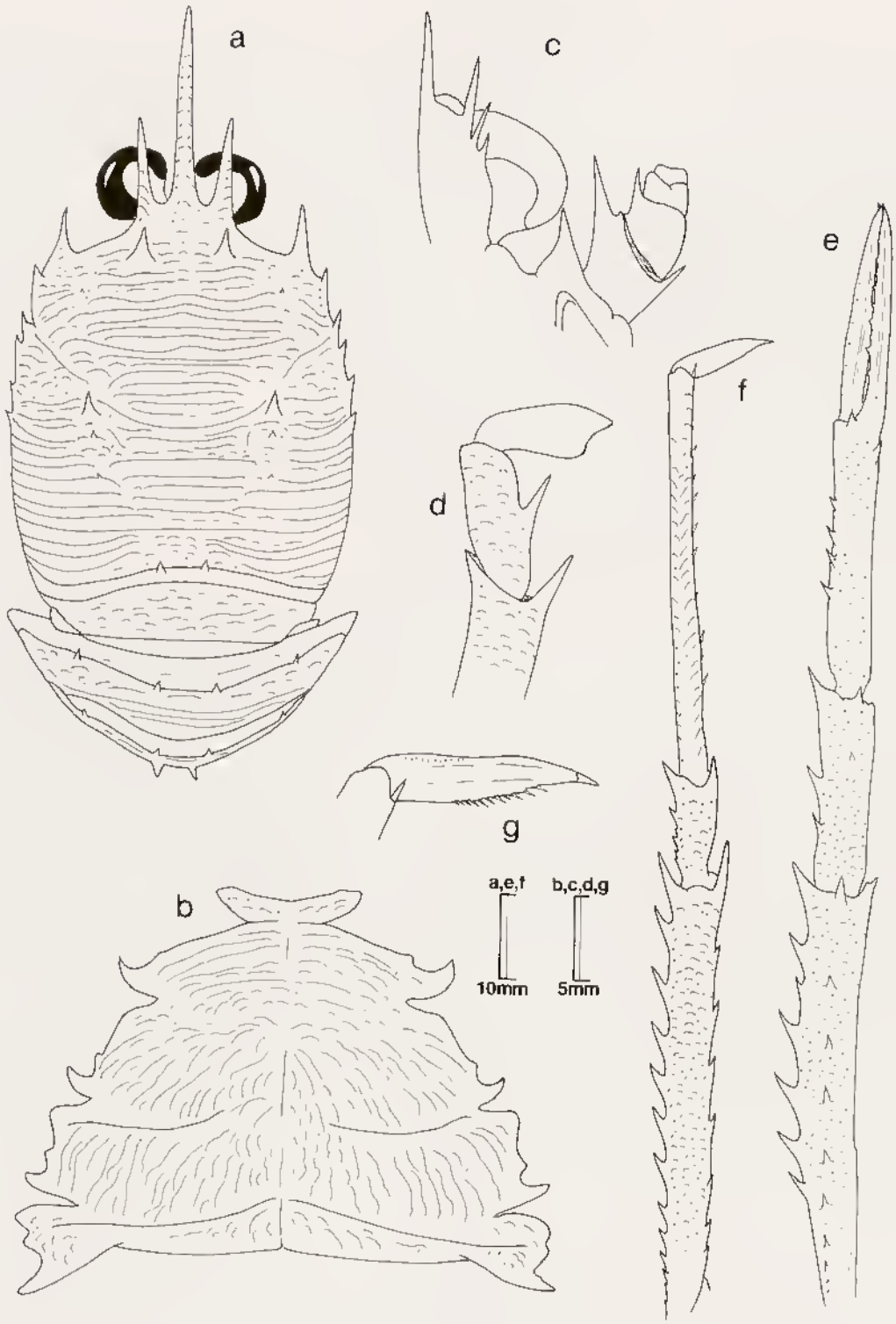

FIG. 35. — *Munida ocyrhoe* sp. nov., ov. ♀ 25.0 mm, holotype from Stn 62 (SMIB 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

M. ocyrhoe is also related to *M. pilosimanus* Baba, 1969, from Tosa Bay (type locality), Okinawa, Kyushu-Palau Ridge and Sulu Archipelago (BABA, 1988). The comparison of the new species with specimens from Kyushu-Palau Ridge (see Remarks under *M. laurentae* for the material examined) shows several small but constant differences :

— The parahepatic spines are well developed in *M. pilosimanus*, very small in the new species.

— The frontal margins are oblique in the new species, transverse in *M. pilosimanus*.

— The striae on the thoracic sternites are more numerous in *M. ocyrhoe*, than in *M. pilosimanus*.

SIZE. — The males examined ranged between 8.2. and 28.4 mm; females from 7.6 and 29.4 mm; ovigerous females from 12.4 mm.

DISTRIBUTION. — New Caledonia and Chesterfield Islands, between 470 and 650 m.

Munida olivarae sp. nov.

Figs 36, 80

MATERIAL EXAMINED. — **New Caledonia.** LAGON : stn 433, 40-67 m : 1 ♂ 3.2 mm; 1 ov. ♀ 4.8 mm (USNM). — Stn 495, 80 m : 2 ♂ 3.9 and 5.1 mm (MNHN-Ga 2916).

Passe de la Meurthe, 6-10 m, 16.11.1991: 1 ov. ♀ 5.0 mm; 2 ♀ 5.0 and 5.3 mm (MNHN-Ga 3321).

Loyalty Islands. MUSORSTOM 6 : stn 430, 30 m : 1 ♂ 4.9 mm (MNHN-Ga 2918). — Stn 436, 33 m : 2 ♂ 3.8 and 6.3 mm (MNHN-Ga 2919, 2920). — Stn 437, 31 m : 1 ♂ 5.2 mm (MNHN-Ga-2921).

Matthew and Hunter Islands. VOLSMAR : stn 60, 190 m : 1 ♂ 4.4 mm; 2 ov. ♀ 4.0 and 4.3 mm (MNHN-Ga 2922).

TYPES. — One male of 6.3 mm from MUSORSTOM 6, Stn 436 (MNHN-Ga 2919) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to M. P. OLIVAR of the Instituto de Ciencias del Mar, Barcelona, for her valuable contributions to the Namibian marine fauna.

DESCRIPTION. — Carapace with few secondary striae between main striae. Intestinal region without scales. Frontal margin distinctly oblique. External orbital spine short, mesial to level of lateral margin. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh smooth. Abdominal segments unarmed. Second and third abdominal segments each with one transverse stria. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) ending at same level as the cornea, distomesial spine longer than distolateral. First segment of antennal peduncle with distomesial spine not reaching end of second segment; distomesial spine on second segment reaching end of third segment. Extensor border of merus of third maxilliped with distal spine. Fixed and movable fingers of cheliped with a row of spines along lateral and mesial margin, respectively. Dactylus of walking legs slightly shorter than propodus, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments red. Epigastric, hepatic, anterior branchial and cardiac regions whitish. Rostrum and supraocular spines orange. Dorsal side of antennal peduncles red. Second to fourth abdominal segments with white spots. Chelipeds and walking legs with transverse red and white bands. Palm and proximal half of fingers white, with one red spot; distal half of fingers orange. Dactylus of walking legs reddish.

REMARKS. — *M. olivarae* is closely related to *M. clinata* sp. nov. from the Philippines, New Caledonia and Chesterfield Islands, described above, and to *M. roshanei* Tirmizi, 1966, from the Red Sea and Northwestern Indian Ocean (TIRMIZI, 1966).

Source : MNHN, Paris

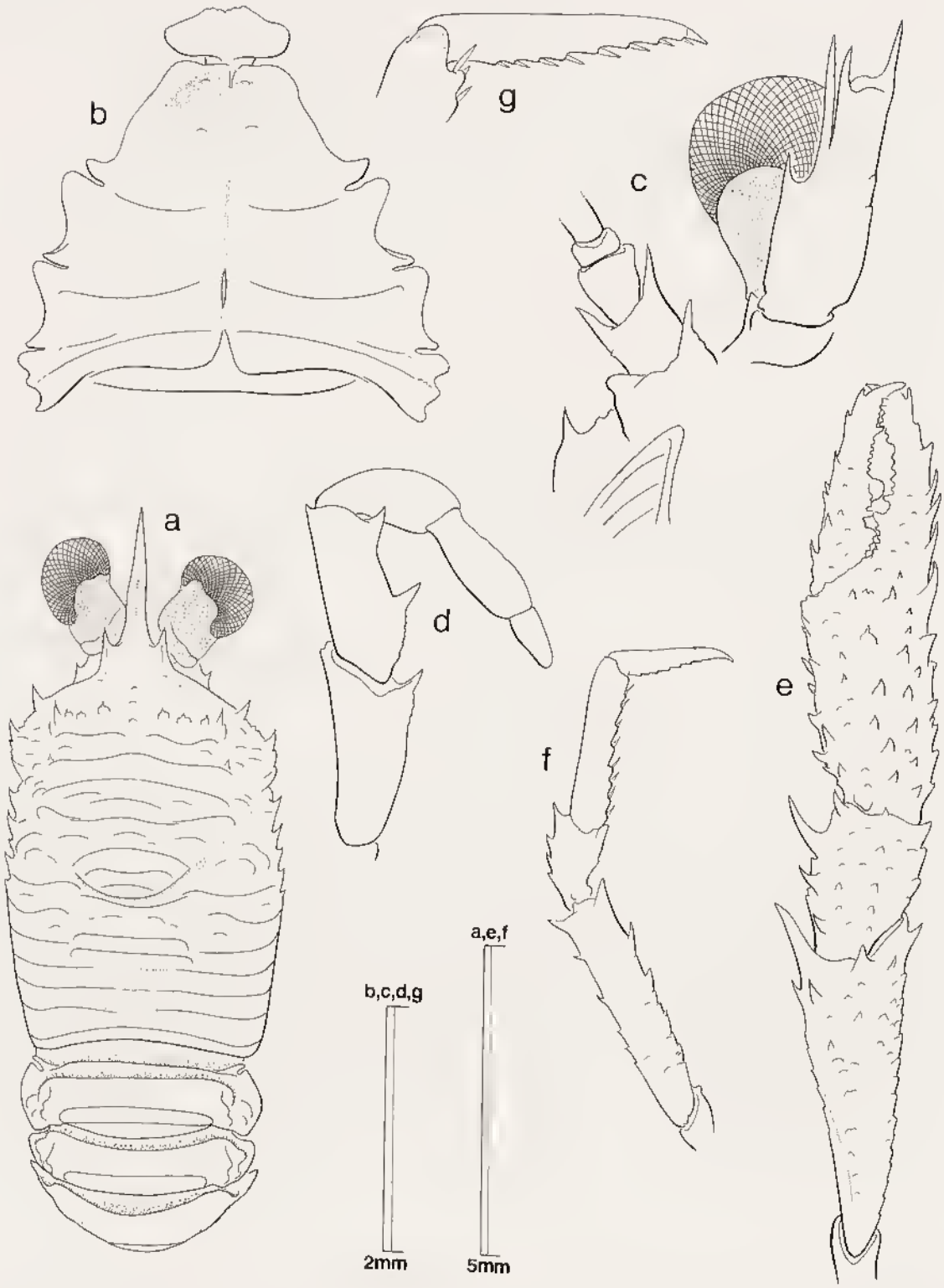

FIG. 36. — *Munida olivarae* sp. nov., ♂ 6.3 mm, holotype from Stn 436 (MUSORSTOM 6) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

The examination of the types of *M. roshanei* (Gulf of Oman, holotype, ♂ 4.7 mm; Gulf of Aden, paratype, ♂ 4.5 mm, BM) and additional material (Gulf of Suez, ♂ 5.0 mm, MNHN-Ga 770) shows that this species is easily differentiable from the two new species by the presence of numerous striae on the thoracic sternites and the absence of spines on the fingers of the chelipeds. In *M. clinata* and *M. olivarae* the thoracic sternites are smooth, without striae and the movable and fixed fingers of the chelipeds have a row of spines along the mesial and lateral borders, respectively.

M. olivarae can be distinguished from *M. clinata* by the following features :

— The distal spines on the basal segment of the antennular peduncle are subequal in *M. clinata*, whereas the distomesial spine is longer than the distolateral in *M. olivarae*.

— The palm of the cheliped has more spines on the dorsal side in *M. olivarae* than in *M. clinata*.

— The propodus of the walking legs in *M. olivarae* is slightly longer than the dactylus, whereas the propodus is about 1.5 times the dactylus length in *M. clinata*.

SIZE. — The males examined ranged between 3.2 and 6.3 mm, the females between 4.0 and 5.3 mm; ovigerous female from 4. 0 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Matthew and Hunter Islands, between 6 and 190 m.

Munida pagesi sp. nov.

Fig. 37

MATERIAL EXAMINED. — **New Caledonia.** LAGON : stn 904, 250-300 m : 1 ♀ 10.0 mm (MNHN-Ga 2928). — Stn 993, 375-400 m : 1 ♀ 13.0 mm (MNHN-Ga 3324).

BIOCAL : stn 108, 335 m : 1 ♀ 6.8 mm (MNHN-Ga 2923). — Stn 109, 495 m : 2 ♂ 9.8 and 12.1 mm; 1 ov. ♀ 17.8 mm; 3 ♀ 10.0 to 11.2 mm (MNHN-Ga 3322).

MUSORSTOM 4 : stn 236, 495-550 m : 1 ♀ 5.3 mm (USNM). — Stn 239, 470-475 m : 1 ♀ 13.7 mm (MNHN-Ga 3325). — Stn 241, 470-480 m : 5 ♂ 8.3 to 14.1 mm; 3 ov. ♀ 9.7 to 13.0 mm; 2 ♀ 10.8 and 19.8 mm (MNHN-Ga 3326). — Stn 242, 500-550 m : 1 ♂ 10.2 mm; 1 ov. ♀ 18.5 mm (MNHN-Ga 2925, 2926). — Stn 246, 410-420 m : 1 ov. ♀ 9.0 mm (USNM). — Stn 247, 435-460 m : 3 ♂ 12.3 to 20.3 mm; 4 ov. ♀ 13.4 to 20.4 mm (MNHN-Ga 3327).

Loyalty Island. MUSORSTOM 6 : stn 483, 600 m : 1 ♀ 7.6 mm (MNHN-Ga 3323).

TYPES. — The ovigerous female of 18.5 mm from MUSORSTOM 4, Stn 242 (MNHN-Ga 2925) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to F. PAGES of the Instituto de Ciencias del Mar, Barcelona, for his support to systematic studies.

DESCRIPTION. — Carapace with numerous secondary striae. Intestinal region with numerous scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth and fifth thoracic sternites with numerous short arcuate striae; sixth and seventh smooth; fourth sternite anteriormesially hollowed. Second abdominal tergite with a row of 4 pairs of spines on anterior ridge. Second and third abdominal segments each with some transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter slightly more than 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) exceeding cornea, distomesial spine shorter than distotateral. First segment of antennal peduncle with distomesial spine slightly exceeding end of second segment; distomesiat spine on second segment exceeding antennat peduncle. Extensor margin of merus of third maxilliped unarmed. Movable and fixed fingers of cheliped with a row of spines along mesial and lateral borders, respectively. Dactylus of walking legs 3/4 length of propodus, with movable spinules along ventral margin, terminal third unarmed.

REMARKS. — *M. pagesi* is closely related to *M. sacksi* Macpherson, 1993, from the Phitippines and New Caledonia (MACPHERSON, 1993). The two species can be easily distinguished by the following constant characters :

— The carapace is distinctly more convex in *M. pagesi* than in *M. sacksi*.

Source : MNHN, Paris

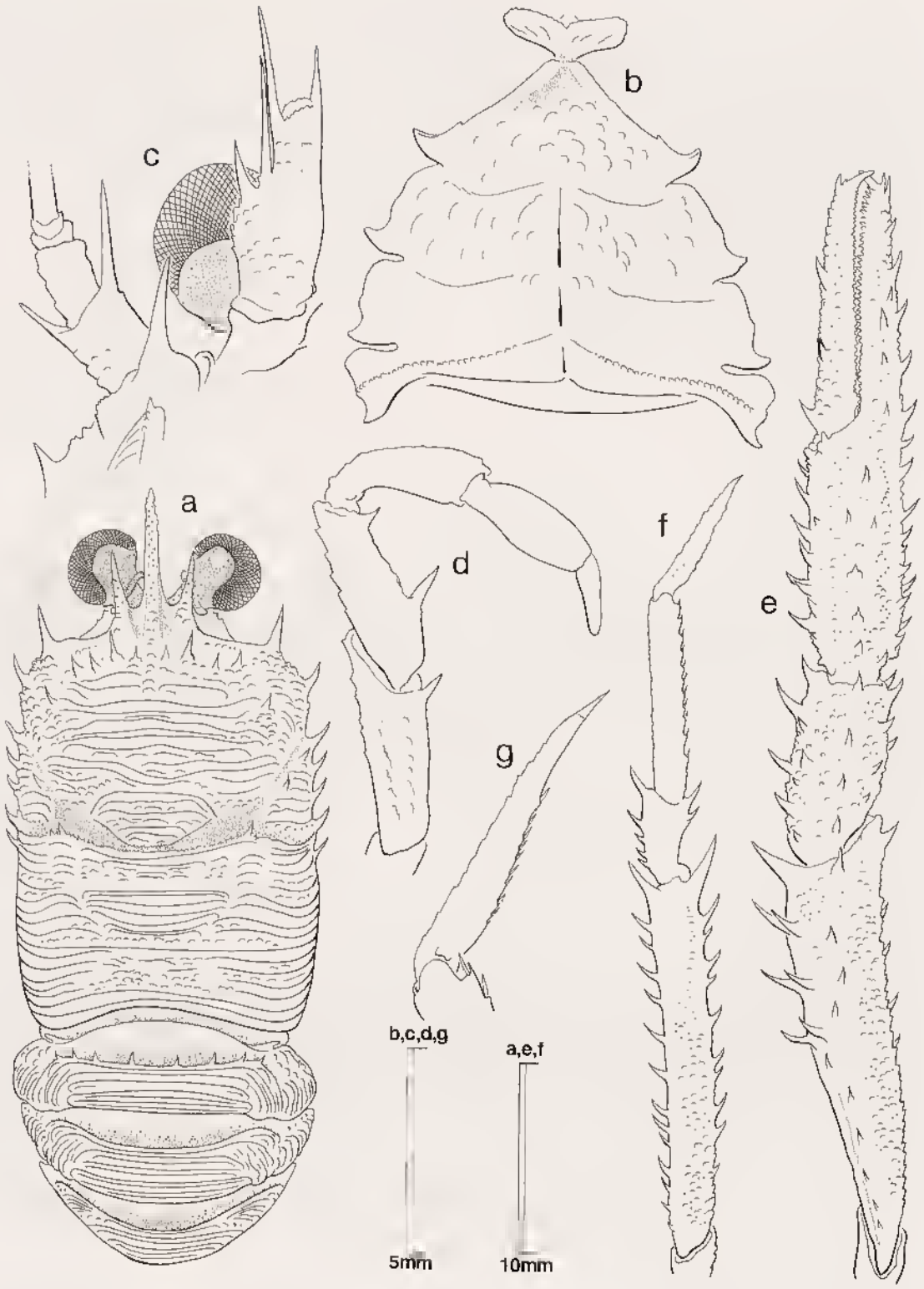

FIG. 37. — *Munida pagesi* sp. nov., ov. ♀ 18.5 mm, holotype from Stn 242 (MUSORSTOM 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

— If specimens of similar sizes of the two species are compared, the carapace and the abdominal segments distinctly have more secondary striae in *M. pagesi* than in *M. sacksi*.

— The fourth and fifth thoracic sternites in *M. pagesi* have numerous short arcuate striae; in *M. sacksi* these sternites are smooth.

SIZE. — The males examined measured between 8.3 and 20.3 mm; the females ranged between 5.3 and 20.4 mm; ovigerous females from 9.0 mm.

DISTRIBUTION. — New Caledonia and Loyalty Islands, between 250 and 600 m.

Munida pontoporea sp. nov.

Fig. 38

MATERIAL EXAMINED. — **New Caledonia.** CORAIL 2 : stn 162, 203-208 m : 1 ov. ♀ 10.9 mm, holotype (MNHN-Ga 2944).

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (Pontoporea).

DESCRIPTION. — Carapace with secondary striae. Intestinal region with one scale. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few arcuate striae; lateral parts of sixth and seventh thoracic sternites with many small granules. Second abdominal tergite with a row of 4 pairs of spines on anterior ridge. Second and third abdominal segments each with 3 transverse striae. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) distinctly exceeding cornea, distomesial spine slightly longer than distolateral. First segment of antennal peduncle with distomesial spine exceeding second segment; distomesial spine on second segment distinctly exceeding antennal peduncle. Extensor border of merus of third maxilliped unarmed. Movable and fixed fingers of cheliped with several spines along mesial and lateral borders, respectively. Dactylus of walking legs more than 1/2 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. pontoporea* is closely related to *M. taenia* sp. nov. from New Caledonia and Chesterfield Islands (see below, under the Remarks of *M. taenia* for the differences between these species), and *M. lineola* sp. nov. from New Caledonia. The latter differs from *M. pontoporea* in the following aspects:

— The granules of the lateral parts of the thoracic sternites form several rows in *M. lineola*, whereas they are homogeneously scattered in *M. pontoporea* .

— The distomesial spine on the basal antennular segment is longer than the distolateral in *M. pontoporea;* whereas these spines are subequal in *M. lineola*.

DISTRIBUTION. — New Caledonia, between 203 and 208 m.

Munida proto sp. nov.

Fig. 39

MATERIAL EXAMINED. — **New Caledonia.** SMIB 5 : stn 82, 155 m : 1 ov. ♀ 4.4 mm (USNM).
Loyalty Islands. MUSORSTOM 6 : stn 481, 300 m : 1 ov. ♀ 5.9 mm (MNHN-Ga 2945).
Chesterfield Islands. MUSORSTOM 5 : stn 274, 285 m : 1 ♂ 4.0 mm (MNHN-Ga 2946). — Stn 282, 226-230 m : 1 ov. ♀ 4.0 mm (MNHN-Ga 2947). — Stn 301, 487-610 m : 1 ♂ 3.8 mm (MNHN-Ga 3500). — Stn 305, 430-440 m : 2 ♂ 3.6 and 4.3 mm (MNHN-Ga 3503). — Stn 339, 380-395 m : 2 ♂ 4.1 and 4.5 mm : 1 ♀ 5.0 mm (MNHN-Ga 3501).

TYPES. — One ovigerous female of 5.9 mm from MUSORSTOM 6, Stn 481 (MNHN-Ga 2945) has been selected as the holotype; the other specimens are paratypes.

Source : MNHN, Paris

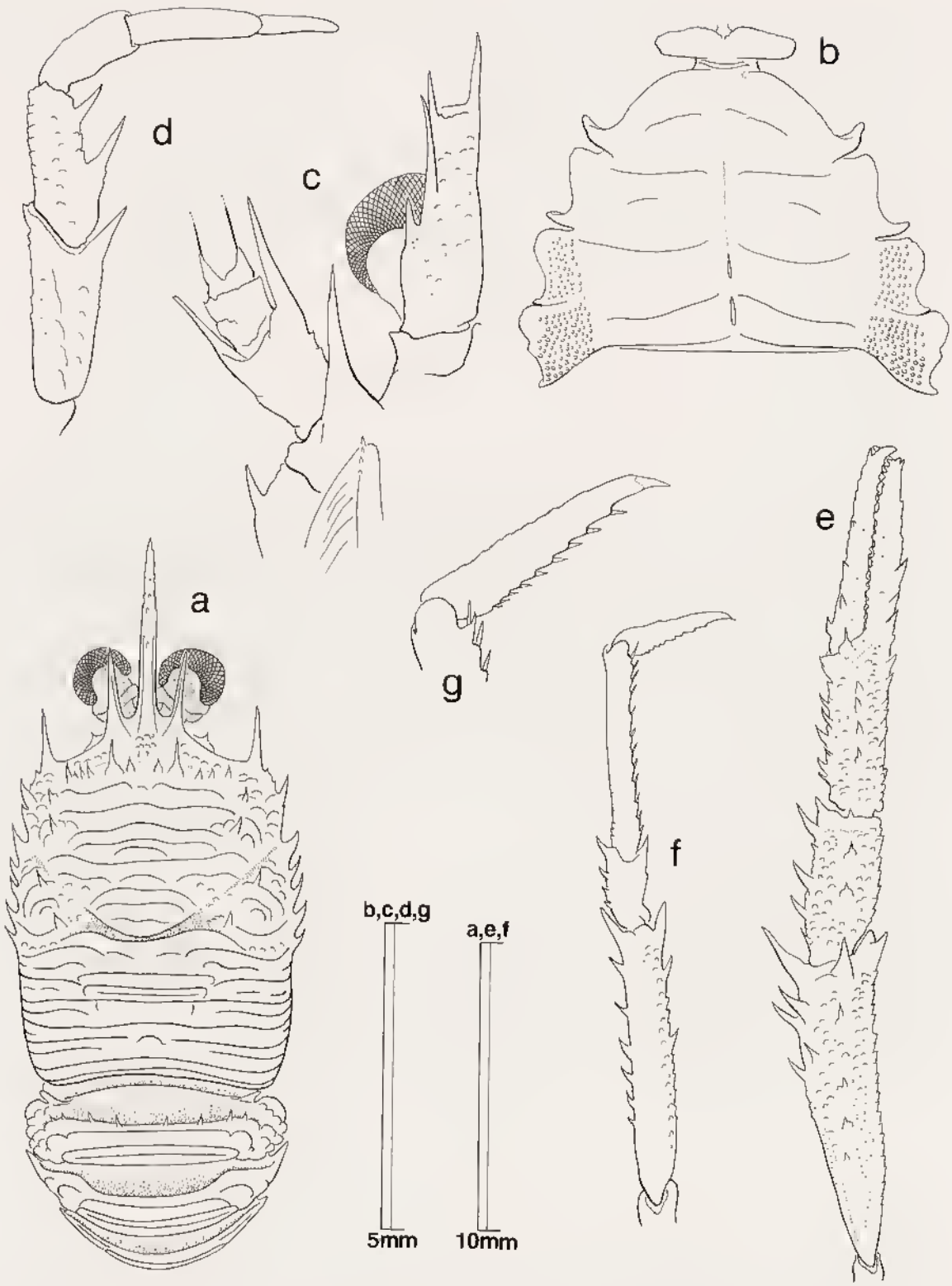

FIG. 38. — *Munida pontoporea* sp. nov., ov. ♀ 10.9 mm, holotype from Stn 162 (CORAIL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

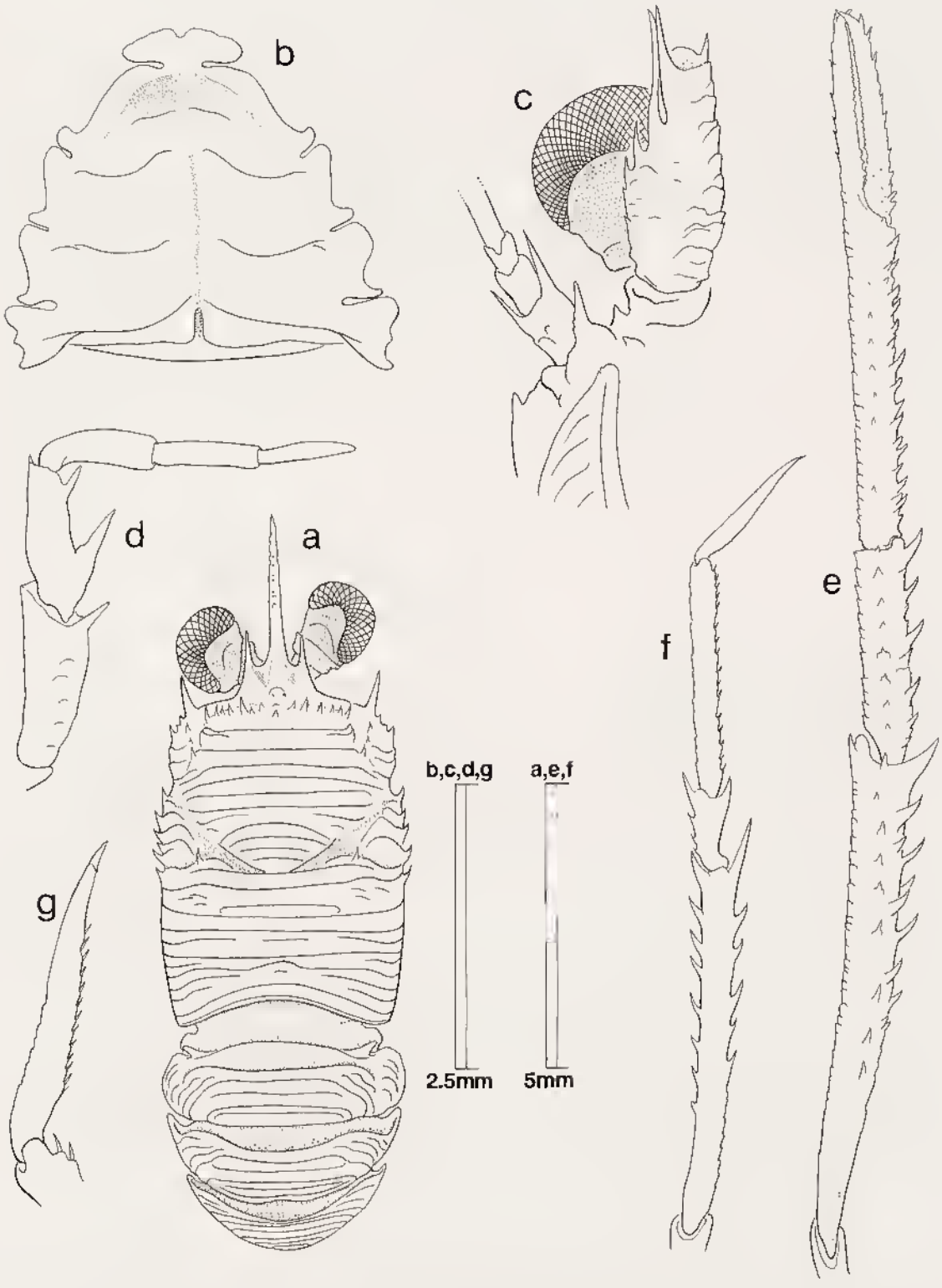

FIG. 39. — *Munida proto* sp. nov., ov. ♀ 5.9 mm, holotype from Stn 481 (MUSORSTOM 6) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

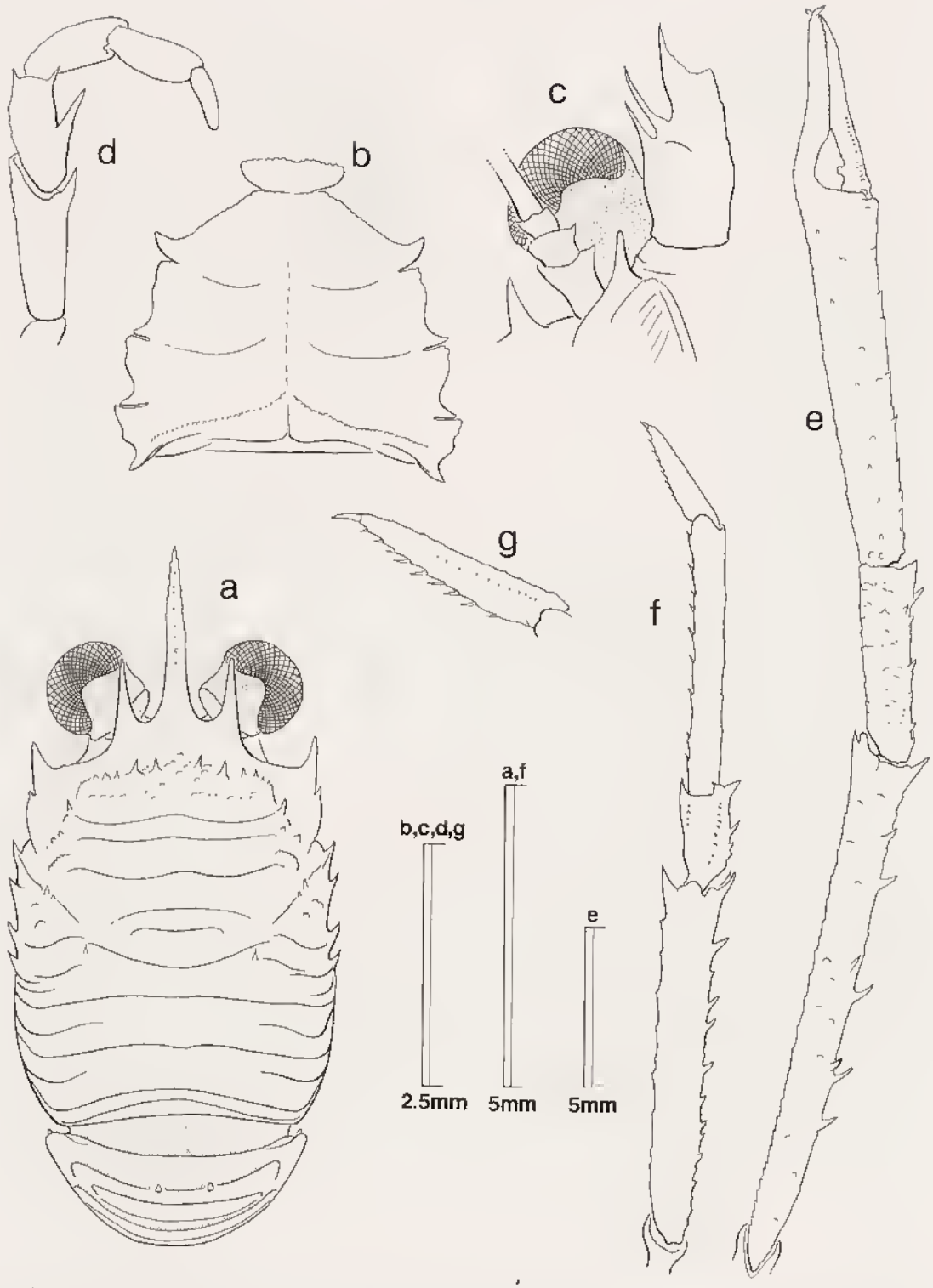

FIG. 40. — *Munida psamathe* sp. nov., ♂ 5.8 mm, holotype from Stn 73 (CHALCAL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, left first walking leg, lateral view; **g**, dactylus of left first walking leg, lateral view.

Source : MNHN, Paris

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (Proto).

DESCRIPTION. — Carapace with secondary striae. Intestinal region often with small scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few striae; fifth to seventh smooth. Abdominal segments unarmed. Second and third abdominal segments each with several transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) slightly exceeding cornea, distomesial spine small distinctly shorter than distolateral. First segment of antennal peduncle with distomesial spine reaching end of second segment; distomesial spine on second segment exceeding third segment. Extensor border of merus of third maxilliped with distal spine. Fingers of cheliped with a row of spines along mesial and lateral margins of movable and fixed finger, respectively. Walking legs about 2.5 times carapace length; dactylus about 1/2 propodus length, with movable spinules along ventral margin, distal third unarmed.

REMARKS. — *M. proto* is closely related to *M. stia* sp. nov. from New Caledonia and Chesterfield Islands. However, both species are easily differentiable by the length of the chelipeds and walking legs, distinctly more longer and slenderer in *M. proto* than in *M. stia*.

SIZE.— The males examined measured between 3.6 and 4.5 mm, females between 4.0 and 5.9 mm; ovigerous females from 4.4 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Chesterfield Islands, between 155 and 610 m.

Munida psamathe sp. nov.

Figs 40, 93

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn 51, 680-700 m : 1 ♂ 3.7 mm; 1 ♀ 4.6 mm (MNHN-Ga 3508).

MUSORSTOM 4 : stn 242, 500-550 m : 1 ♂ 5.1 mm (MNHN-Ga 2948).

CHALCAL 2 : stn 73, 573 m : 7 ♂ 3.8 to 5.8 mm; 4 ov. ♀ 3.3 to 4.8 mm (MNHN-Ga 2949, 2950). — Stn 74, 650 m : 9 ♂ 4.5 to 6.5 mm; 8 ov. ♀ 4.0 to 4.7 mm (MNHN-Ga 2951). — Stn 75, 600 m : 6 ♂ 4.7 to 6.3 mm; 3 ov. ♀ 3.6 to 4.9 mm; 1 ♀ 4.8 mm (USNM).

SMIB 3 : stn 2, 530 m : 1 ♂ 5.6 mm (MNHN-Ga 2953).

Matthew and Hunter Islands. VOLSMAR : stn 5, 700 m : 6 ♂ 3.2 to 5.3 mm; 4 ov. ♀ 3.6 to 4.8 mm; 2 ♀ 4.4 and 4.8 mm (MNHN-Ga 2954).

TYPES. — One male of 5.8 mm from CHALCAL 2, Stn 73 (MNHN-Ga 2949) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (Psamathe).

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines. Thoracic sternites smooth. Second abdominal segment with 2 median spines on anterior ridge. Second and third abdominal segments each with one transverse stria. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) slightly exceeding cornea, distomesial spine small, distinctly shorter than distolateral. Antennal peduncle reduced; first segment with short distomesial spine reaching end of second segment; distomesial spine on second segment short, distinctly not reaching end of third segment. Extensor border of merus of third maxilliped with distal spine. Fingers of cheliped unarmed. Dactylus of walking legs half as long as propodus, with movable spinules along entire ventral margin.

Source : MNHN, Paris

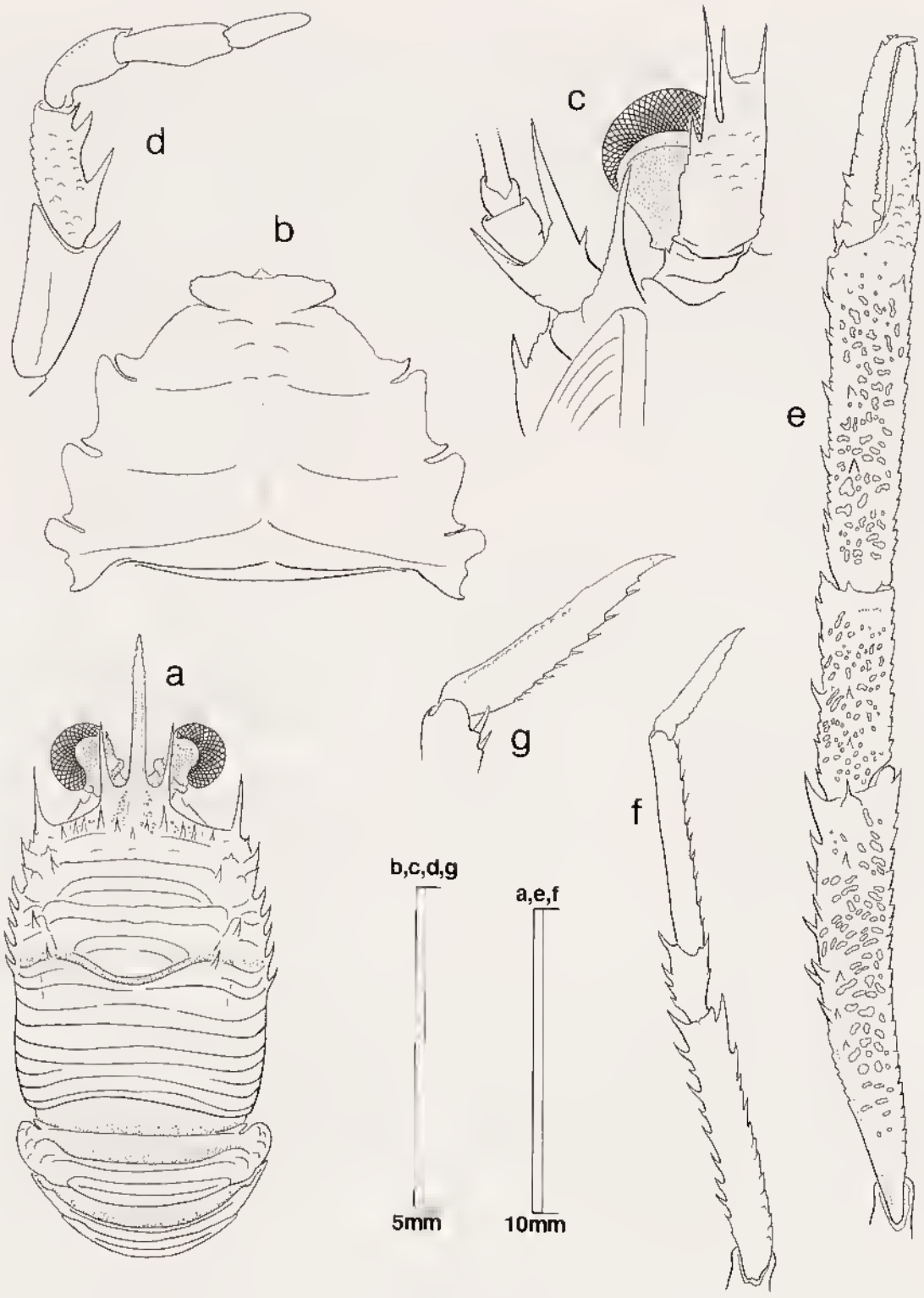

FIG. 41. — *Munida pseliophora* sp. nov., ♂ 9.0 mm, holotype from Stn 419 (MUSORSTOM 6) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennula and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

COLOUR. — Ground colour of carapace and abdominal segments orange, gastric region reddish. Rostrum and supraocular spines orange. Chelipeds and walking legs orange. Distal part of fingers of chelipeds and daclylus of walking legs white.

REMARKS. — *M. psamathe* is closely related to *M. masi* sp. nov. from New Caledonia described above. The two species are easily differenliable by several constant characters :

— The carapace and abdominal segments have more secondary striae in *M. masi* than in *M. psamathe*.

— The second abdominal segment bears two median spines in *M. psamathe*, instead of 6 spines in *M. masi*.

— The distomesial spine on lhe lateral antennular segmenl is distinctly shorter than the distolateral in *M. psamathe*, whereas both spines are subequal in *M. masi*.

— The anlennal peduncle is reduced in *M. psamathe*, whereas is well developed in *M. masi*.

— The fingers of cheliped are unarmed in *M. psamathe*, whereas the fingers are armed with some spines in *M. masi*.

— The dactylus of the walking legs in *M. masi* is unarmed on the distal third of the ventral border, whereas the spines are along the entire ventral margin in *M. psamathe*.

SIZE. — The males examined ranged belween 3.2 and 6.5 mm, females between 3.3 and 4.9 mm; ovigerous female from 3.3 mm.

DISTRIBUTION. — New Caledonia, Matthew and Hunter Islands, between 500 and 700 m.

Munida pseliophora sp. nov.

Figs 41, 94

MATERIAL EXAMINED. — **Loyalty Islands.** MUSORSTOM 6 : stn 419, 283 m : 5 ♂ 8.3 to 9.4 mm; 3 ov. ♀ 7.7 to 9.6 mm; 2 ♀ 8.3 and 8.5 mm (MNHN-Ga 2955, 2956).

Chesterfield Islands. MUSORSTOM 5 : stn 258, 300 m : 2 ov. ♀ 5.6 and 6.0 mm (MNHN-Ga 2957). — Stn 267, 285 m : 1 ♀ 3.2 mm (MNHN-Ga 2958). — Stn 274, 285 m : 1 ov. ♀ 4.6 mm (MNHN-Ga 2959).

TYPES. — The male (9.0 mm) from MUSORSTOM 6, Stn 419 (MNHN-Ga 2955) has been selected as holotype; the olher specimens are paratypes.

ETYMOLOGY. — From the Greek, *pseliophoros*, carrying a bracelet, in reference to the red band on the posterior half of lhe carapace.

DESCRIPTION. — Carapace with few secondary striae. Posterior striae not interrupted on intestinal region. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with some striae; fifth to seventh sternites smooth. Abdominal segments unarmed. Second and third abdominal segments each with 2-3 transverse striae. Males wilh two pairs of gonopods on firsl and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace hetween bases of external orbital spines. Basal segment of antennule (distal spines excluded) slightly exceeding the level of cornea, with 2 subequal distal spines. Firsl segment of antennal peduncle wilh long distomesial spine reaching end of lhird segmenl; distomesial spine on second segment distinctly exceeding antennal peduncle. Extensor border of merus of third maxilliped unarmed. Fixed finger of cheliped wilh a row of spines along laleral margin; movable finger with 2 spines on proximal half of mesial margin, and one distal spine. Dactylus of walking legs 2/3 propodus length, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and ahdominal segmenls orange. Rostrum and supraocular spines orange. Red band along branchial and posterior borders of carapace. Second to fourth abdominal segments with median and lateral red spots. Chelipeds orange, distal part of fingers white. Walking legs with transverse orange and white bands.

Source : MNHN, Paris

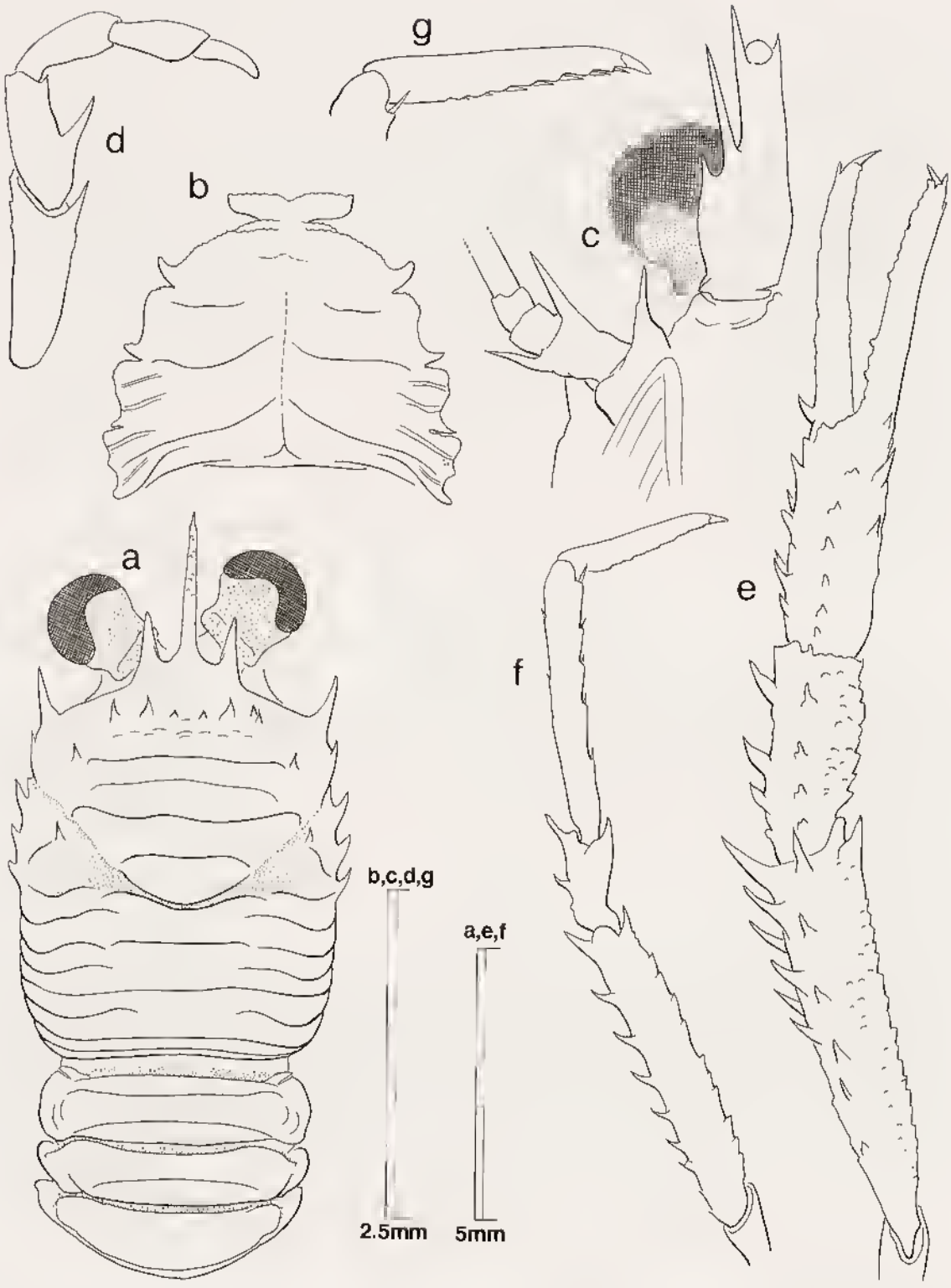

FIG. 42. — *Munida psylla* sp. nov., ov. ♀ 5.3 mm, holotype from Stn 67 (BIOCAL) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

REMARKS. — *M. pseliophora* is closely related to *M. leagora* sp. nov. from New Caledonia, Loyalty Islands and Chesterfield Islands, however, they can be differentiated by several characters :

— The intestinal region has one scale in *M. leagora*, absent in *M. pseliophora*.

— The eye in *M. leagora* is large, the maximum corneal diameter is about 1/2 the length of the anterior border of the carapace between the bases of the external orbital spines, whereas is about 1/3 in *M. pseliophora*.

— The colour pattern is different in both species (see Figs 76 and 94).

SIZE. — The males examined ranged between 8.3 and 9.4 mm, females between 3.2 and 9.6 mm; ovigerous females from 4.6 mm.

DISTRIBUTION. — Loyalty Islands and Chesterfield Islands, between 283 and 300 m.

Munida psylla sp. nov.

Fig. 42

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 67, 500-510 m : 1 ov. ♀ 5.3 mm (MNHN-Ga 2960).
CHALCAL 2 : stn 73, 573 m : 1 ♂ 3.5 mm (MNHN-Ga 2961).
Loyalty Islands. MUSORSTOM 6 : stn 480, 380 m : 1 ♂ 3.0 mm (USNM).

TYPES. — One ovigerous female of 5.3 mm from BIOCAL, Stn 67 (MNHN-Ga 2960) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY.— From the Greek, *psylla*, flea, in reference to the small size of the species. The name is considered as a substantive in apposition.

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. External orbital spine well developed situated, at anterolateral angle of carapace. Branchial margin with 3-4 spines quite similar in size. Fourth thoracic sternite with several short arcuate striae; lateral surfaces of sixth and seventh thoracic sternites with distinct carinae. Second abdominal segment unarmed. Second and third abdominal segments each with one transverse stria. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) distinctly exceeding cornea, distomesial spine distinctly shorter than distolateral. First segment of antennal peduncle with distomesial spine reaching end of second segment; distomesial spine on second segment exceeding antennal peduncle. Extensor border of merus of third maxilliped unarmed. Movable finger of cheliped with basal and distal spines; fixed finger with two distal spines. Dactylus of walking legs 3/4 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. psylla* is closely related to *M. sentai* Baba, 1986, from Andaman Sea. However, after the description and illustrations provided by BABA (1986b), they are easily differentiable by the presence of small spines on the hepatic region in *M. sentai*, absent in the new species. Furthermore, *M. sentai* has numerous secondary striae on the carapace, absent in the new species. On the other hand, *M. sentai* has two subequal distal spines on the basal antennular segment, whereas in *M. psylla* the distolateral spine is distinctly longer than the distolateral.

DISTRIBUTION. — New Caledonia and Chesterfield Islands, between 380 and 573 m.

Munida rhodonia sp. nov.

Figs 13a, 43, 81

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 198, 590 m : 25 ♂ 9.7 to 12.3 mm; 13 ov. ♀ 9.5 to 12.9 mm; 2 ♀ 9.2 and 13.4 mm (MNHN-Ga 2963, 2964). — Stn 202, 580 m : 1 ♂ 13.8 mm; 4 ov. ♀ 8.7 to 10.2 mm;

Source : MNHN, Paris

6 ♀ 6.3 to 10.2 mm (USNM). — Stn 238, 500-510 m : 1 ♂ 6.3 mm; 1 ♀ 6.5 mm; 1 juv. 3.8 mm (MNHN-Ga 2966). — Stn 240, 475-500 m : 1 ♂ 12.0 mm (MNHN-Ga 2967).

Loyalty Islands. MUSORSTOM 6 : stn 466, 540 m : 1 ♂ 13.8 mm (MNHN-Ga 2969). — Stn 470, 560 m : 1 ♂ 13.3 mm (MNHN-Ga 3213).

Chesterfield Islands. CORAIL 2 : stn 13 : 700-705 m : 1 ov. ♀ 10.7 mm (MNHN-Ga 2968).

TYPES. — The male of 11.5 mm from MUSORSTOM 4, Stn 198 (MNHN-Ga 2963) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *rhodon*, rose, in reference to the colour of the species. The name is considered as a substantive in apposition.

DESCRIPTION. — Carapace with numerous secondary striae. Intestinal region with scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh sternites smooth. Second abdominal tergite with a row of 4-5 pairs of spines on anterior ridge. Second to fourth segments each with numerous transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, with 2 subequal distal spines. First segment of antennal peduncle with distomesial spine not reaching end of second segment; distomesial spine on second segment reaching end of antennal peduncle. Extensor border of merus of third maxilliped unarmed. Palm of cheliped as long as fingers; movable finger unarmed; fixed finger with one distal spine, near tip. Dactylus of walking legs 3/4 length of propodus, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments pinkish. Rostrum and supraocular spines reddish. Chelipeds and walking legs pinkish. Fingers of chelipeds and dactylus of walking legs whitish.

REMARKS. — *M. rhodonia* is closely related to *M. rosula* sp. nov. from New Caledonia, Loyalty Islands and Chesterfield Islands (see the differences under the Remarks of the latter).

Munida rhodonia is the species figured on the cover of this volume.

SIZE. — The males examined ranged between 6.3 and 13.8 mm, females between 6.3 and 13.4 mm; ovigerous females from 8.7 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Chesterfield Islands, between 475 and 705 m.

Munida rogeri sp. nov.

Fig. 44

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 65, 245-275 m : 1 ov. ♀ 6.7 mm (MNHN-Ga 2970).

CHALCAL 2 : stn 18, 274 m : 1 ♂ 4.3 mm (MNHN-Ga 2973).

Loyalty Islands. MUSORSTOM 6 : stn 455, 260 m : 1 ♂ 6.5 mm (USNM). — Stn 474, 260 m : 1 ♂ 5.2 mm ; 1 ov. ♀ 4.0 mm (MNHN-Ga 2972).

Chesterfield Islands. MUSORSTOM 5 : stn 276, 258-269 m : 1 ♂ 6.8 mm (MNHN-Ga 2974). — Stn 280, 270 m : 1 ♂ 5.0 mm (MNHN-Ga 2975). — Stn 287, 265-270 m : 5 ♂ 6.0 to 8.2 mm (MNHN-Ga 2976, 2977). — Stn 288, 270 m : 3 ♀ 5.4 to 8.3 mm (MNHN-Ga 2978). — Stn 289, 273 m : 2 ov. ♀ 6.5 and 6.7 mm (MNHN-Ga 2979, 3490). — Stn 291, 300 m : 1 ♂ 8.4 mm (USNM). — Stn 299, 360-390 m : 1 ♂ 4.7 mm (MNHN-Ga 2981). — Stn 345, 305-310 m : 2 ♂ 8.0 and 8.2 mm (MNHN-Ga 2982). — Stn 368, 305 m : 1 ♂ 4.7 mm (MNHN-Ga 2983).

TYPES. — One male of 7.7 mm from MUSORSTOM 5, Stn 287 (MNHN-Ga 2976) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to Roger VILLANUEVA of the Instituto de Ciencias del Mar, Barcelona, for his support in my work and his important contribution to the taxonomy of cephalopods.

Source : MNHN, Paris

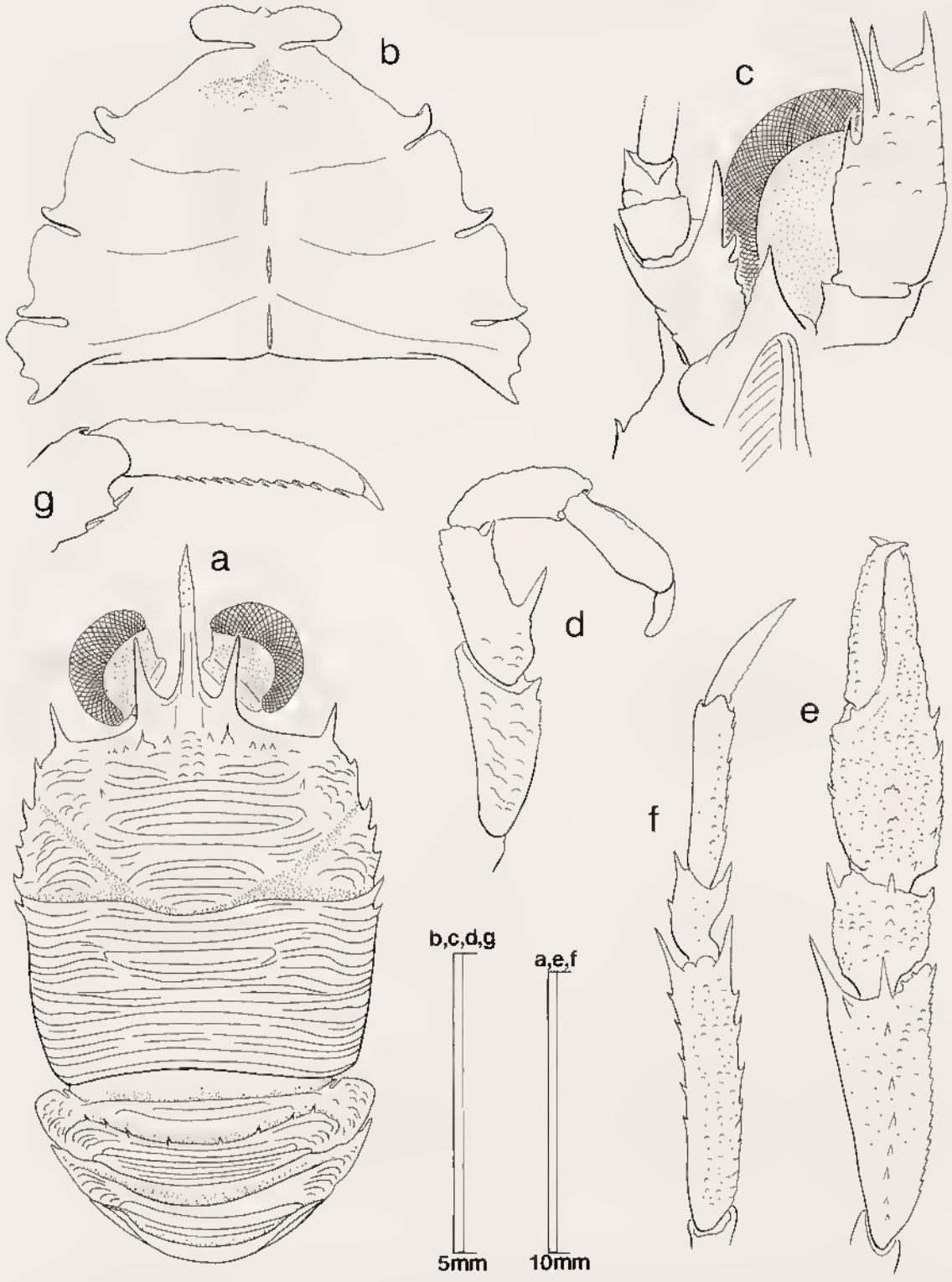

FIG. 43. — *Munida rhodonia* sp. nov., ♂ 11.5 mm, holotype from Stn 198 (MUSORSTOM 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

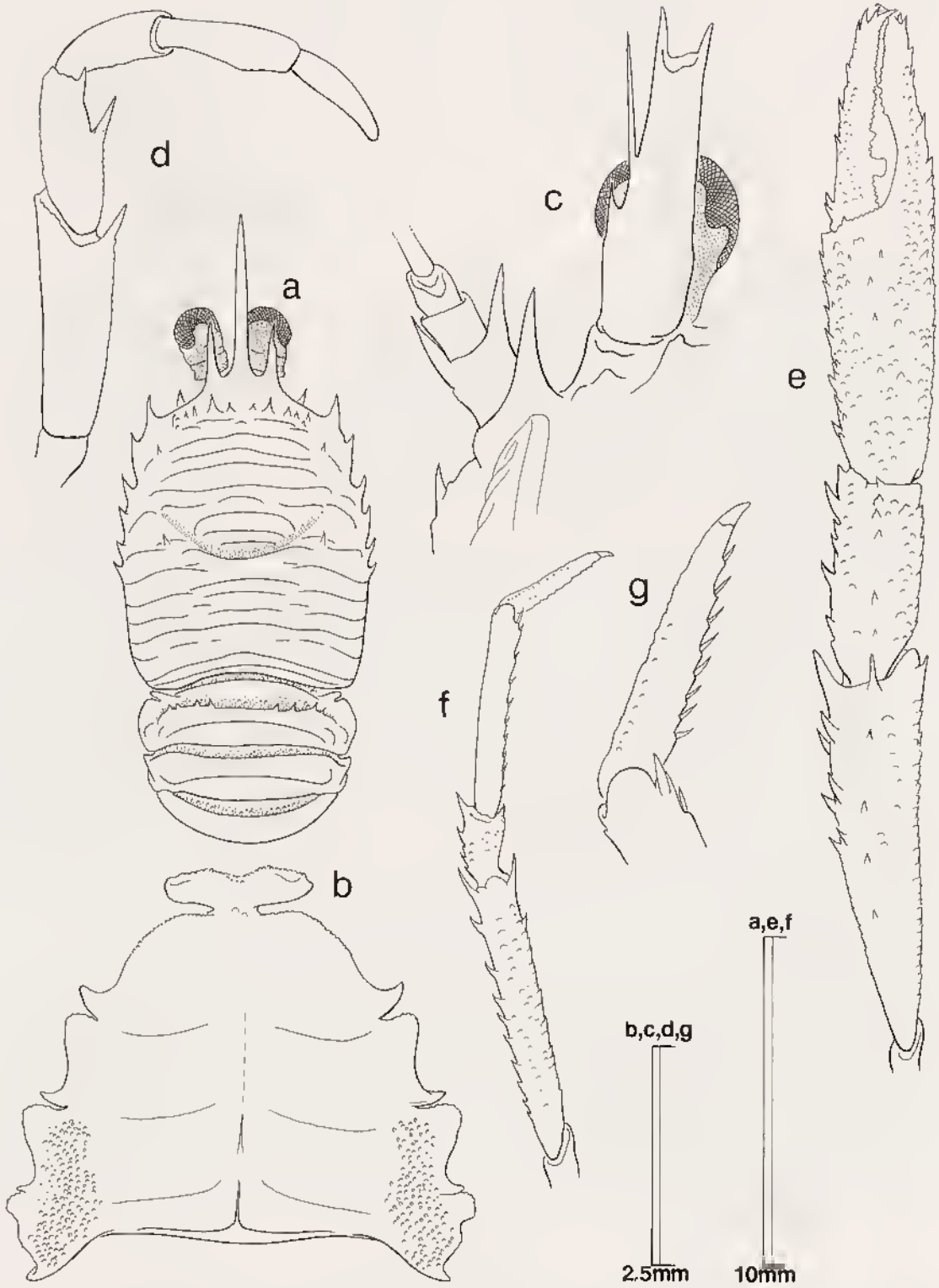

FIG. 44. — *Munida rogeri* sp. nov., ♂ 7.7 mm, holotype from Stn 287 (MUSORSTOM 5) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

DESCRIPTION. — Carapace with secondary striae nearly absent. Intestinal region without scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines. Thoracic sternites smooth; lateral parts of sixth and seventh sternites with numerous small granules. Second abdominal segment with a row of 4 pairs of spines on anterior ridge. Second and third abdominal segments each with one transverse continuous stria, fourth and fifth segments without striae. Males with two pairs of gonopods on first and second abdominal segments. Eye small, maximum corneal diameter about 1/4 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) distinctly exceeding cornea, distolateral spine slightly longer than distomesial, occasionally subequal. First segment of antennal peduncle with distomesial spine exceeding second segment; distomesial spine on second segment exceeding third segment. Extensor margin of merus of third maxilliped unarmed. Fixed finger of cheliped with a row of dorsolateral spines, some spines scattered on ventral side; movable finger with a row of spines along mesial border. Dactylus of walking legs half as long as propodus, with movable spinules along entire ventral margin.

REMARKS. — *M. rogeri* is closely related to *M. pasithea* Macpherson & de Saint Laurent, 1991, from the French Polynesia (MACPHERSON & DE SAINT LAURENT, 1991), but they are easily differentiable by the size of the cornea. The eye is small in *M. rogeri* being about 1/4 the length of the anterior border of the carapace between the external orbital spines, in *M. pasithea* this ratio is 1/3.

SIZE. — The males examined ranged between 4.3 and 8.4 mm, females between 4.0 and 8.3 mm; ovigerous females from 4.0 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Chesterfield Islands, between 245 and 390 m.

Munida rosula sp. nov.

Figs 45, 82

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn 32, 825 m : 1 ♂ 12.6 mm (MNHN-Ga 2984). — Stn 33, 675-680 m : 1 ♂ 14.2 mm; 1 ov. ♀ 8.3 mm; 1 juv. 3.7 mm (MNHN-Ga 2985). — Stn 75, 825-860 m : 2 ♀ 9.1 and 10.0 mm (MNHN-Ga 3330).

MUSORSTOM 4 : stn 198, 590 m : 2 ♂ 10.0 and 12.5 mm (USNM).

BIOGEOCAL : stn 232, 760-790 m : 1 ♂ 13.0 mm (USNM). — Stn 292, 465-470 m : 1 ♀ 5.0 mm (MNHN-Ga 3329).

"Vauban" : (without position), 800 m : 1 ♂ 11.2 mm (MNHN-Ga 3328).

Loyalty Islands. MUSORSTOM 6 : stn 438, 780 m : 14 ♂ 9.0 to 13.4 mm; 2 ov. ♀ 16.6 to 17.8 mm; 6 ♀ 9.7 to 12.5 mm (MNHN-Ga 2989, 2990).

Chesterfield Islands. MUSORSTOM 5 : stn 386, 755-770 m : 1 ♀ 6.6 mm (MNHN-Ga 2991). — Stn 387, 650-660 m : 1 ♀ 9.7 mm (MNHN-Ga 2992).

CORAIL 2 : stn 13, 700-705 m : 1 ♀ 8.0 mm (MNHN-Ga 2988).

TYPES. — The male of 11.8 mm from MUSORSTOM 6, Stn 438 (MNHN-Ga 2989) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Latin, *rosula*, in reference to the pink colour of the species.

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh sternites smooth. Second abdominal tergite with a row of 4 pairs of spines on anterior ridge. Second to fourth segments each with 1-2 transverse striae. Males with two pairs of gonopods present on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, with 2 subequal distal spines. First segment of antennal peduncle with distomesial spine reaching end of second segment; distomesial spine on second segment exceeding third segment. Extensor border of merus of third maxilliped unarmed. Palm of cheliped distinctly shorter than fingers; movable finger unarmed; fixed finger with 2 distal spines, occasionally with one basal spine. Dactylus of walking legs more than 1/2 length of propodus, with movable spinules along entire ventral margin.

Source : MNHN, Paris

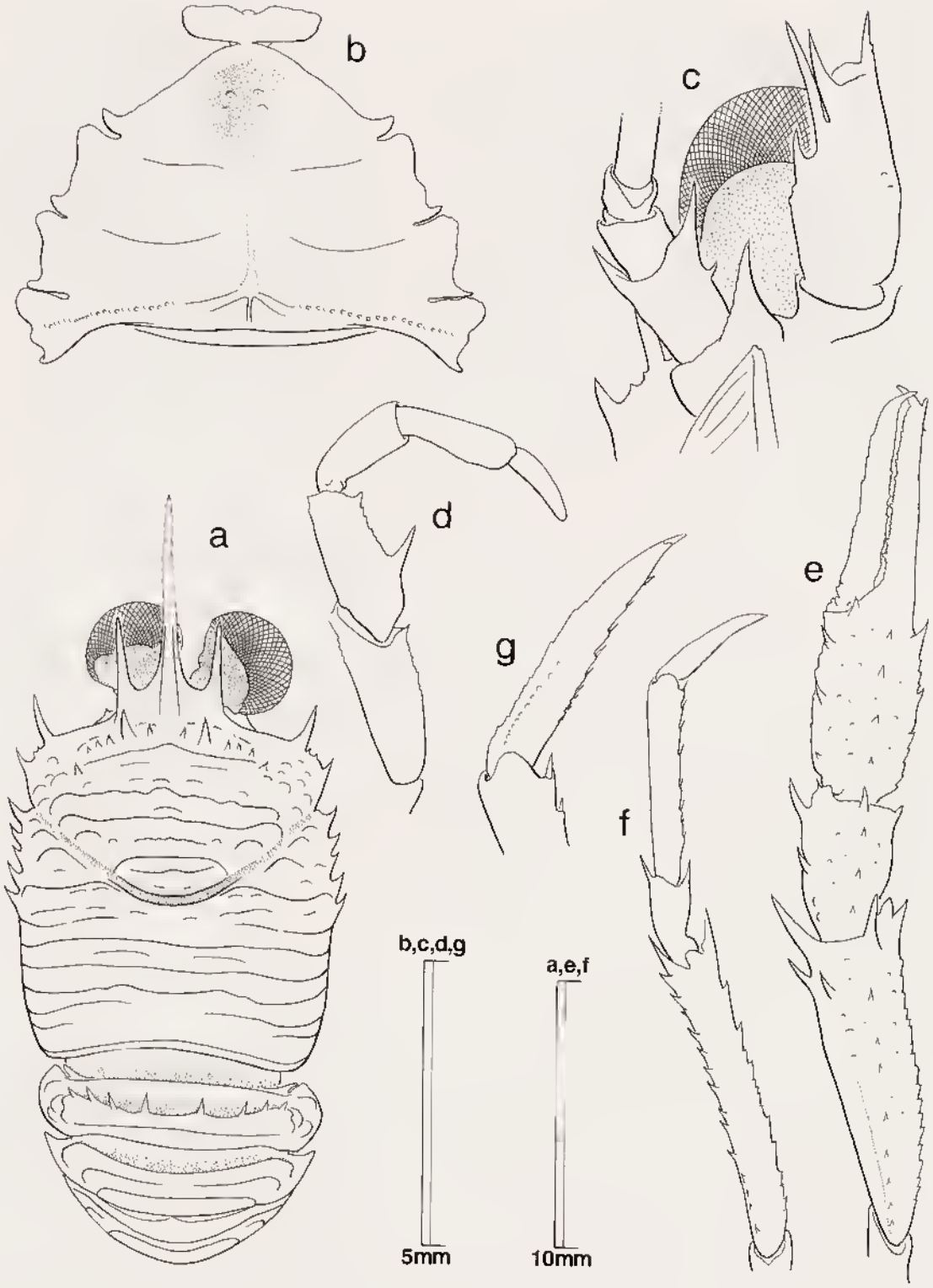

FIG. 45. — *Munida rosula* sp. nov., ♂ 11.8 mm, holotype from Stn 438 (MUSORSTOM 6) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

COLOUR. — Ground colour of carapace and abdominal segments pink. Rostrum and supraocular spines white. Chelipeds and walking legs pinkish, darker on terminal half of articles. Fingers of chelipeds and dactylus of walking legs whitish.

REMARKS. — *M. rosula* is closely related to *M. rhodonia* sp. nov. from New Caledonia, Loyalty Islands and Chesterfield Islands They are distinguished by :

— The carapace and the abdominal segments have numerous secondary striae in *M. rhodonia*, these secondary striae are nearly absent in *M. rosula*.

— The chelipeds is shorter and more massive in *M. rhodonia* than in *M. rosula*. In *M. rhodonia* the palm is as long as the fingers, whereas in *M. rosula* the palm is distinctly shorter than the fingers.

— The colour patterns are very different (see Figs. 80 and 81).

SIZE. — The males examined ranged between 9.0 and 14.2 mm, females from 6.6 and 17.8 mm; ovigerous females from 8.3 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Chesterfield Islands, between 465 and 860 m.

Munida rufiantennulata Baba, 1969

Figs 46, 83

Munida rufiantennulata Baba, 1969a : 23, fig. 7; 1988 : 83 (key), 128; 1989 : 131.

MATERIAL EXAMINED. — **Japan**. 06.08.1967, 32°13.6'N, 128°20.2'E, 167 m : 1 ♀ 6.4 mm, holotype; 1 ov. ♀ 5.2 mm, paratype (ZLKU).

Philippines. MUSORSTOM 2 : stn 36, 569-595 m : 1 ♂ 13.3 mm; 1 ov. ♀ 11.6 mm; t ♀ 8.0 mm (USNM). — Stn 51, t70-187 m : 1 ov. ♀ 6.5 mm (MNHN-Ga 2994).

MUSORSTOM 3 : stn 144, 379-383 m : 4 ♂ 4.3 to t1.6 mm (MNHN-Ga 2995).

New Caledonia. BIOCAL : stn 8, 435 m : t ♂ 6.9 mm; 1 ov. ♀ 5.5 mm (USNM). — Stn 66, 515 m : 2 ♂ 5.2 and 6.5.mm (MNHN-Ga 3332). — Stn 82, 440-460 m : 1 ♂ 9.0 mm; 1 ov. ♀ 6.5 mm (MNHN-Ga 3333). — Stn 83, 460 m : 1 ♂ 6.0 mm (MNHN-Ga 2649).

MUSORSTOM 4 : stn 236, 495-550 m : 1 ♀ 6.7 mm (MNHN-Ga 2997). — Stn 238, 500-510 m : t ♂ 8.0 mm; 1 ov. ♀ 6.8 mm (MNHN-Ga 2998).

SMIB 3 : stn 21, 525 m : 1 ♂ t0.6 mm (MNHN-Ga 2999).

SMIB 4 : stn 36, 530 m : t ♂ 5.2 mm (MNHN-Ga 3331).

Loyalty Islands. MUSORSTOM 6 : stn 391, 390 m : 1 ov. ♀ 7.3 mm (MNHN-Ga 3000).

Matthew and Hunter Islands. VOLSMAR : stn 6, 480 m : 1 ov. ♀ 7.8 mm (USNM). — Stn 50, 425 m : t ♂ 3.6 mm; 1 ov. ♀ 5.6 mm (MNHN-Ga 3002).

Chesterfield Islands. MUSORSTOM 5 : stn 300, 450 m : 1 ♀ 5.6 mm (MNHN-Ga 3003). — Stn 301, 480-610 m : 2 ♂ 5.0 and 9.0 mm (MNHN-Ga 3004).

REMARKS. — The specimens collected off the Philippines, New Caledonia and adjacent waters agree with the types and the information provided by BABA (1969a, 1988). The lateral surfaces of the sixth and seventh thoracic sternites have distinct crests. The inclination of the frontal margin and the length of the first external orbital spine show certain variations with the specimen size. The type specimens and the specimens smaller than 8 mm of carapace length have the frontal margins distinctly oblique and the external orbital spine short; the larger specimens have the frontal margins more transverse, although oblique, and the external orbital spine well developed. The fixed finger of cheliped has 1 or 2 spines on the proximal half in several specimens, but these spines are absent in others.

BABA (1969a) provided the colour pattern of the type after one week in formalin. This pattern agrees quite well with the colour observed in the specimens collected during MUSORSTOM 5 cruise (Fig. 83).

SIZE. — The males examined ranged between 3.6 and 13.3 mm, females between 5.2 and 11.6 mm; ovigerous females from 5.2 mm.

Source : MNHN, Paris

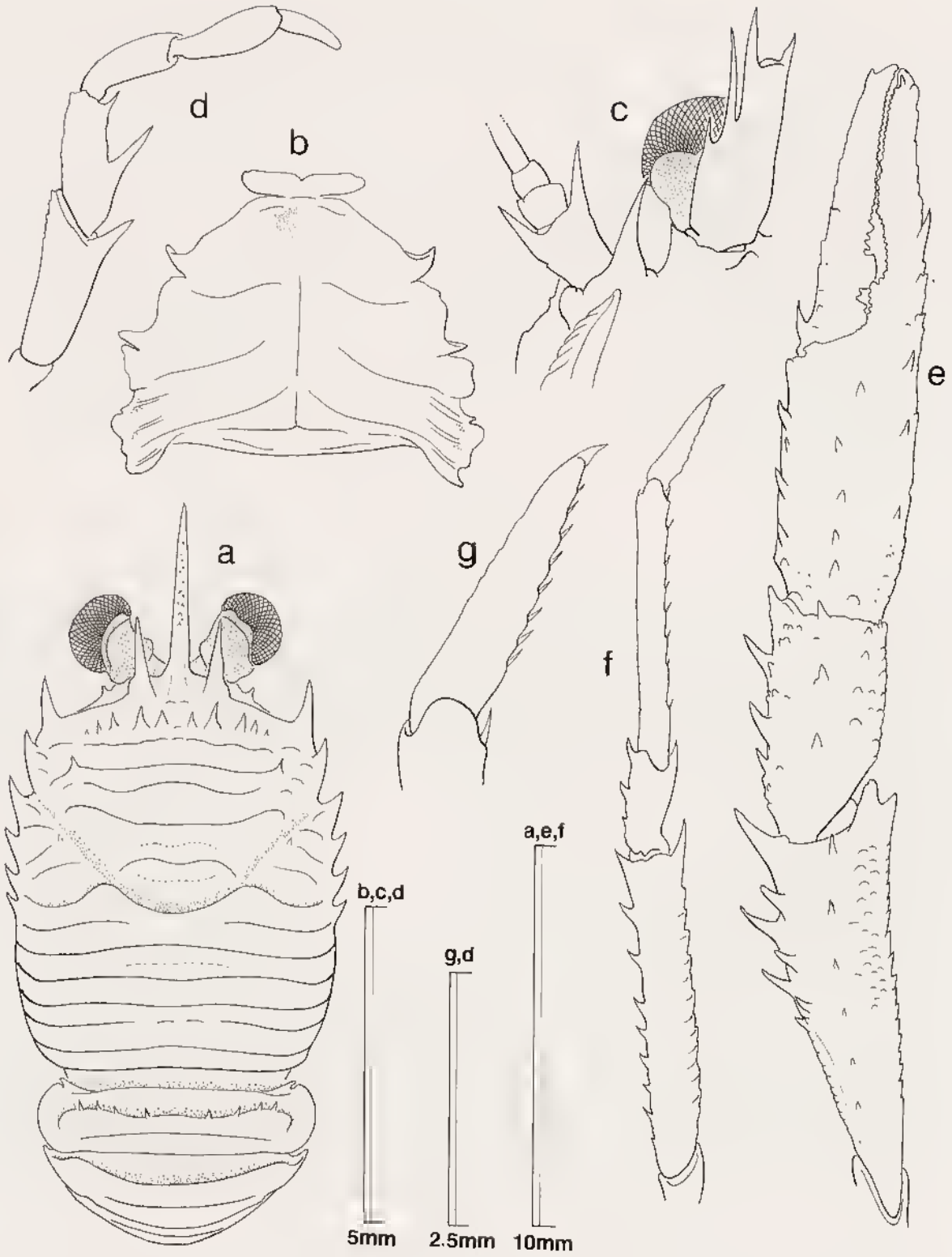

FIG. 46. — *Munida rufiantennulata* Baba, 1969, ♂ 9.0 mm, from Stn 301 (MUSORSTOM 5) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

DISTRIBUTION. — Japan and Philippines, between 45 and 705 m (BABA, 1988; 1989). The present material from the Philippines, New Caledonia, Loyalty Islands, Chesterfield Islands, Matthew and Hunter Islands, was collected between 379 and 610 m.

Munida runcinata sp. nov.

Fig. 47

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 192, 320 m : 2 ov. ♀ 8.1 and 10.0 mm (MNHN-Ga 3335). — Stn 195, 470 m : 8 ♂ 4.8 to 11.1 mm; 6 ov. ♀ 7.2 to 10.0 mm; 4 ♀ 5.3 to 7.5 mm (MNHN-Ga 3336). — Stn 248, 380-385 m : 1 ♂ 7.8 mm (MNHN-Ga 3337).

Loyalty Islands. MUSORSTOM 6 : stn 391, 390 m : 1 ♀ 5.0 mm (USNM). — Stn 464, 430 m : 3 ♂ 7.0 to 9.3 mm; 3 ov. ♀ 8.0 to 10.3 mm; 2 ♀ 7.8 and 9.0 mm (MNHN-Ga 3006, 3007 and USNM). — Stn 487, 500 m : 1 ♂ 7.4 mm (MNHN-Ga 3334).

TYPES. — The male of 8.0 mm from MUSORSTOM 6, Stn 464 (MNHN-Ga 3006) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Latin, *runcinatus*, plain, smooth, in reference to the smooth carapace surface, only armed with epigastric spines.

DESCRIPTION. — Carapace with secondary striae. Intestinal region without scales. Dorsal surface of carapace only with a row of epigastric spines. External orbital spine long, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh smooth. Second abdominal segment unarmed. Second to fifth segments each with several transverse continuous striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, with 2 subequal distal spines. First segment of antennal peduncle with long distomesial spine reaching end of third segment; distomesial spine on second segment distinctly exceeding antennal peduncle. Extensor border of merus of third maxilliped with distal spine. Movable finger of cheliped with one basal and one terminal spine; fixed finger with 2 terminal spines. Dactylus of walking legs 2/3 propodus length, with movable spinules along ventral margin, distal third unarmed.

REMARKS. — *M. runcinata* is closely related to *M. spilota* sp. nov. from New Caledonia and Matthew and Hunter Islands and *M. sao* sp. nov. from New Caledonia (but see below for additional differences under the Remarks of these species).

SIZE. — The males examined ranged between 4.8 and 11.1 mm, females between 5.0 and 10.3 mm; ovigerous females from 7.2 mm.

DISTRIBUTION. — New Caledonia and Loyalty Islands, between 320 and 500 m.

Munida sabatesae sp. nov.

Fig. 48

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 155, 500-570 m : 12 ♂ 13.3 to 20.0 mm; 5 ov. ♀ 16.4 to 18.4 mm; 6 ♀ 4.9 to 20.0 mm (MNHN-Ga 3008). — Stn 162, 535 m : 3 ♂ 8.7 to 19.5 mm; 1 ♀ 12.5 mm (MNHN-Ga 3009). — Stn 167, 575 m : 1 ♂ 17.3 mm (MNHN-Ga 3010). — Stn 180, 450 m : 1 ♂ 15.0 mm; 1 juv. 4.0 mm (MNHN-Ga 3011). — Stn 193, 415 m : 3 ♂ 13.7 to 16.0 mm; 2 ov. ♀ 14.3 to 16.4 mm (MNHN-Ga 3012). — Stn 194, 550 m : 41 ♂ 10.8 to 21.6 mm; 25 ov. ♀ 13.9 to 18.9 mm; 46 ♀ 8.5 to 19.8 mm (MNHN-Ga 3013 and USNM). — Stn 195, 470 m : 5 ♂ 10.7 to 20.4 mm; 3 ov. ♀ 15.0 to 15.7 mm; 4 ♀ 10.0 to 13.1 mm (USNM). — Stn 196, 460 m : 1 ♂ 12.5 mm; 2 ov. ♀ 14.8 and 15.3 mm; 1 ♀ 9.0 mm (MNHN-Ga 3015).

CHALCAL 2 : stn 2, 500-610 m : 1 ♀ 9.4 mm (MNHN-Ga 3017).

SMIB 6 : stn 124, 360-405 m : 1 ♂ 14.6 mm; 1 ov. ♀ 16.6 mm; 1 ♀ 17.0 mm (MNHN-Ga 3018).

New Hebrides Islands. 01.08.1978, 350 m : 1 ov. ♀ 19.8 mm (MNHN-Ga 3019).

Source : MNHN, Paris

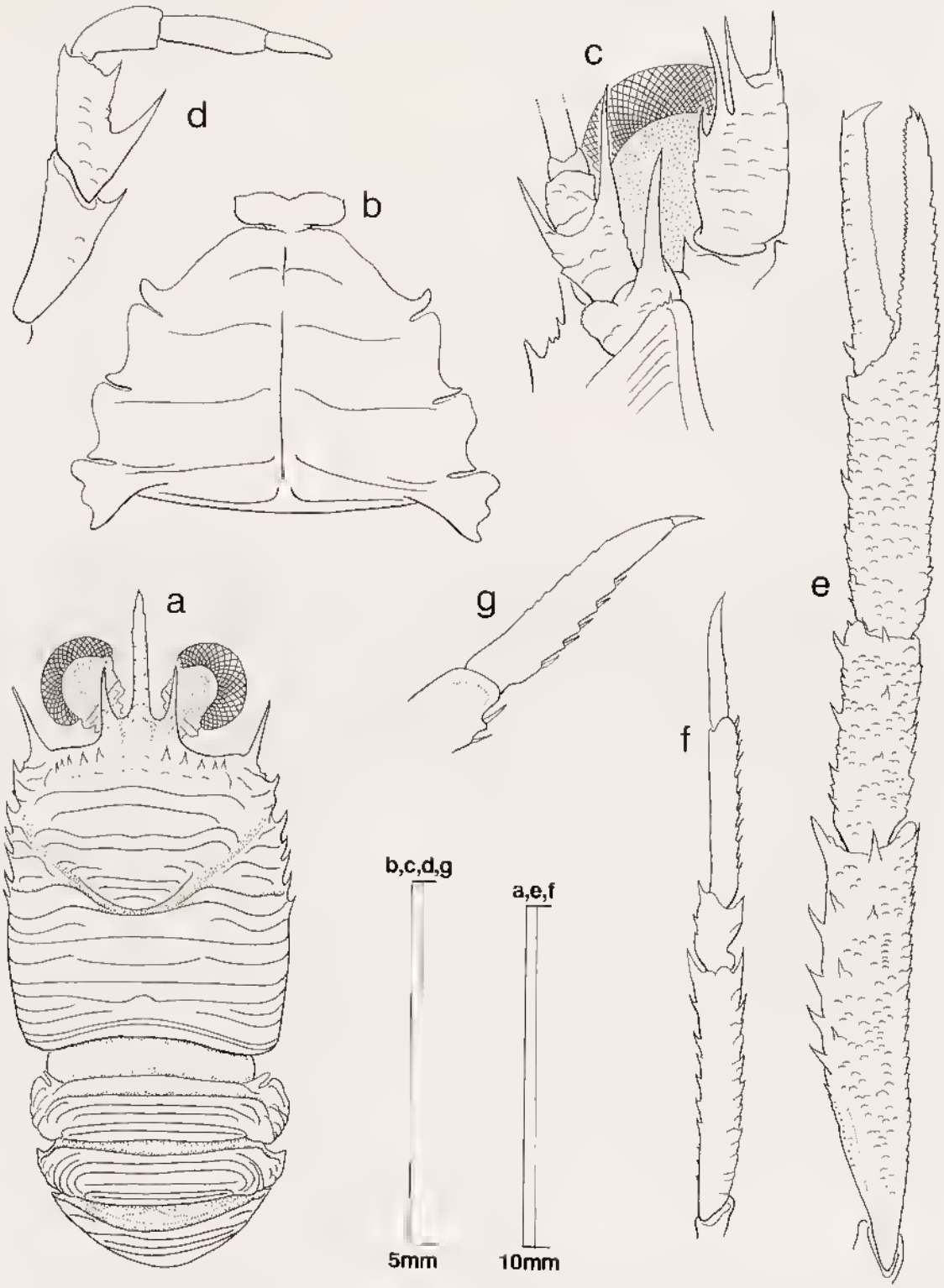

FIG. 47. — *Munida runcinata* sp. nov., ♂ 8.0 mm, holotype from Stn 464 (MUSORSTOM 6) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

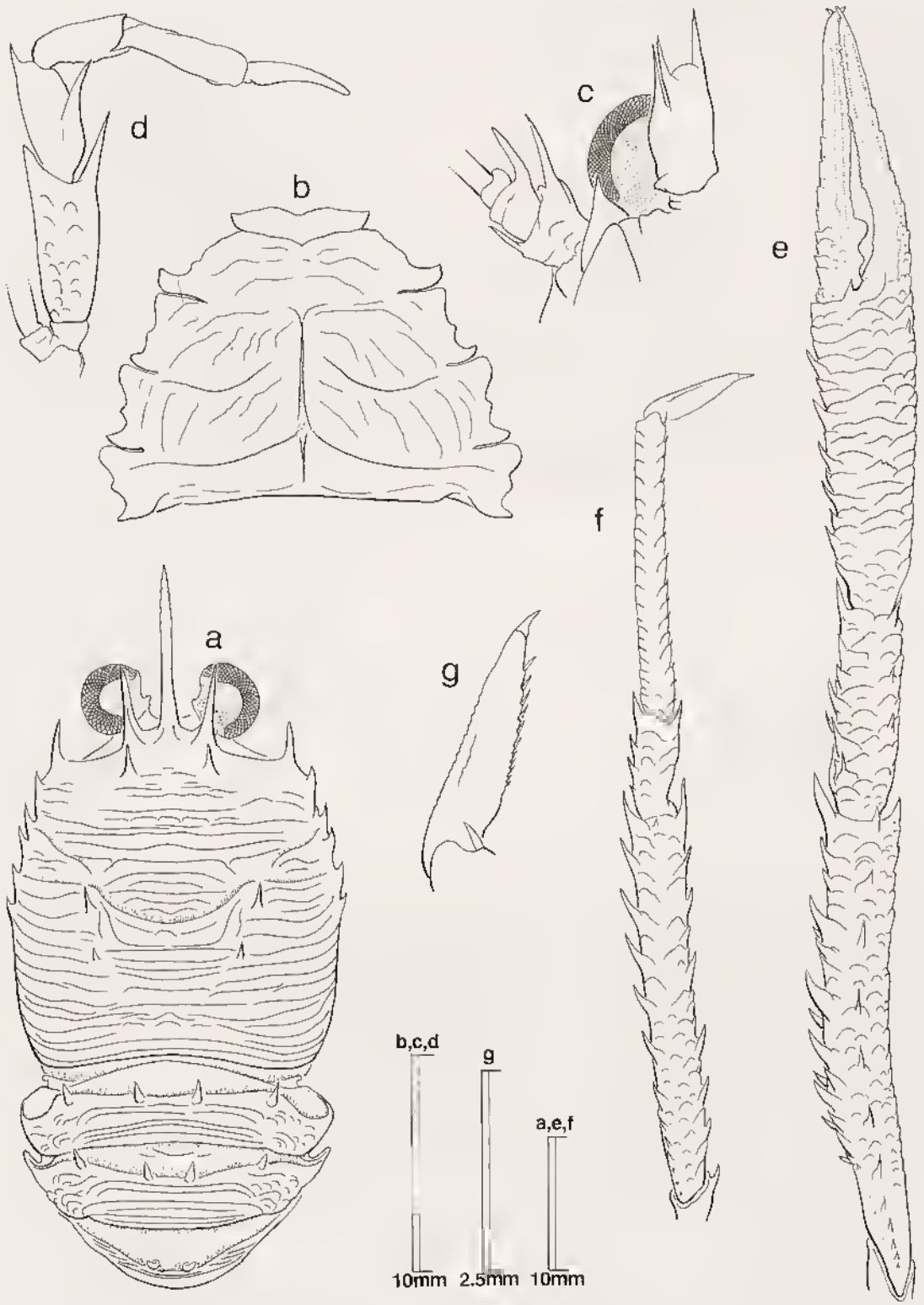

FIG. 48. — *Munida sabatesae* sp. nov., ♂ 17.3 mm, holotype from Stn 167 (MUSORSTOM 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

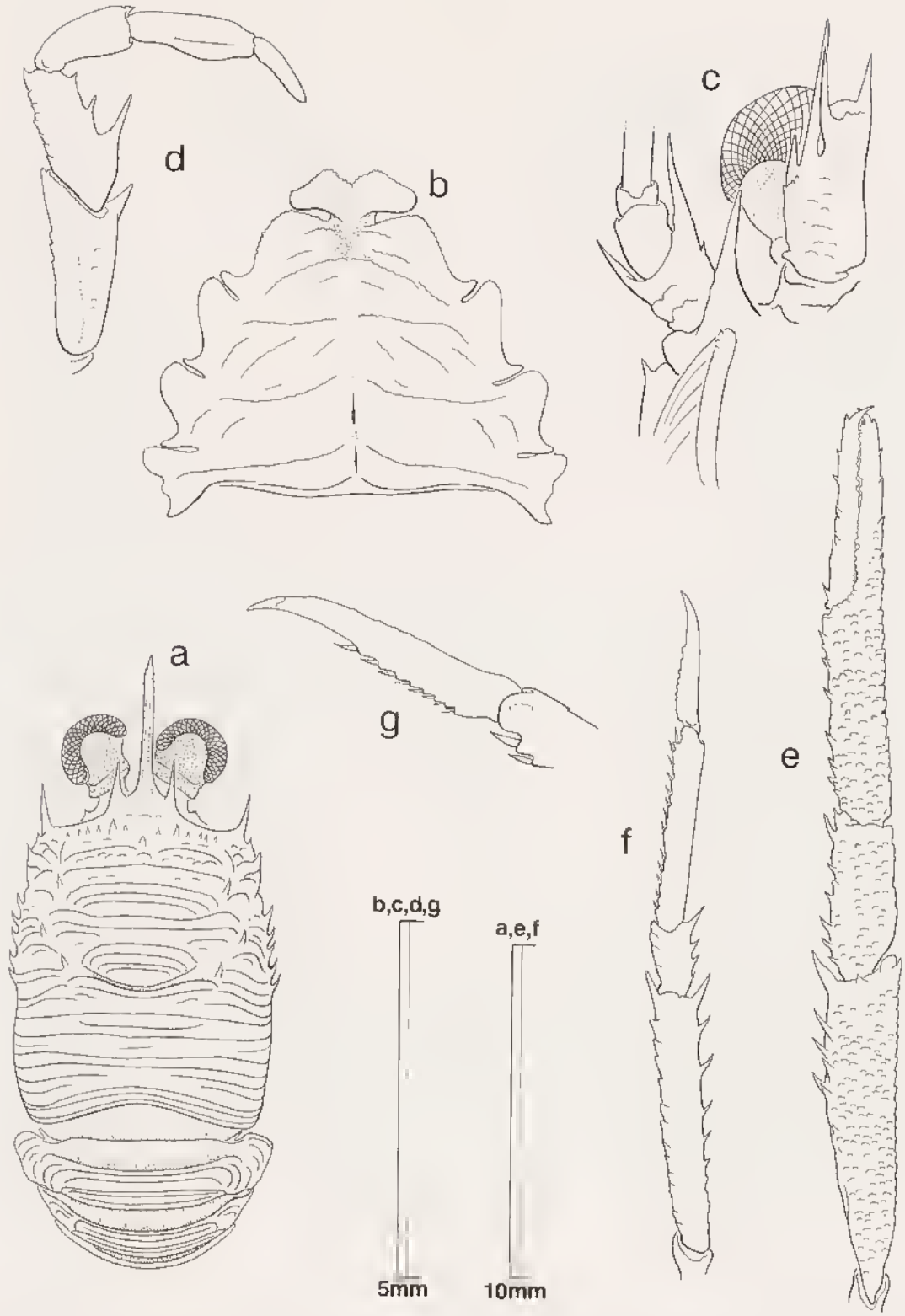

FIG. 49. — *Munida sao* sp. nov., ov. ♀ 7.8 mm, holotype from Stn 538 (LAGON) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, left first walking leg, lateral view; **g**, dactylus of left first walking leg, lateral view.

Source : MNHN, Paris

TYPES. — One male of 17.3 mm from MUSORSTOM 4, Stn 167 (MNHN-Ga 3010) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — This species is dedicated to A. SABATES of the Instituto de Ciencias del Mar, Barcelona, for her support in my research work.

DESCRIPTION. — Carapace with secondary striae between principal striae. Gastric region with 2 epigastric spines behind supraocular spines. Two other spines on each branchiocardiac boundary, anterior one well developed, postcervical, posterior one small, near lateral extremity of cardiac transverse elevation, occasionally one additional small cardiac spine near second branchicardiac spine. Posterior ridge unarmed. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines. Thoracic sternites with numerous arcuate striae. Second and third abdominal segments each with 4 equal-sized spines on anterior transverse ridge; anterior ridge of fourth segment with 2 spines. Males with gonopods absent from first abdominal segment. Eye moderately large, maximum corneal diameter 1/3 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment (distal spines excluded) slightly exceeding cornea, distomesial spine longer than distolateral. First antennal segment moderately produced on mesial margin, reaching end of second segment; distomesial spine on second segment exceeding peduncle; third segment with well developed distomesial spine exceeding antennal peduncle. Merus of third maxilliped bearing median spine on flexor border and distomarginal spine on extensor margin. Tips of fixed finger of cheliped bifid. Dactylus of walking legs about 1/2-1/3propodus length, with spinules along ventral border.

REMARKS. — *M. sabatesae* is closely related to *M. sphecia* sp. nov. from New Caledonia, Loyalty Islands and Chesterfield Islands (see Remarks under *M. sphecia*).

SIZE. — The males examined ranged between 8.7 and 21.6 mm, females between 4.9 and 20.0 mm; ovigerous females from 13.9 mm.

DISTRIBUTION. — New Caledonia and New Hebrides, between 350 and 610 m.

Munida sao sp. nov.

Fig. 49

MATERIAL EXAMINED. — **New Caledonia.** LAGON : stn 537, 200 m : 4 ♂ 6.4 to 7.5 mm; 4 ov. ♀ 6.7 to 7.5 mm; 4 ♀ 6.0 to 6.4 mm (MNHN-Ga 3020, 3402). — Stn 538, 195 m : 6 ♂ 6.4 to 8.8 mm; 2 ov. ♀ 7.8 and 8.6 mm; 3 ♀ 6.4 to 8.7 mm (MNHN-Ga 3021, 3022). — Stn 539, 240 m : 1 ♂ 8.3 mm; 1 ov. ♀ 7.5 mm (MNHN-Ga 3338). — Stn 1146, 185 m : 1 ♀ 5.0 mm (MNHN-Ga 3339). — Stn 1147, 210 m : 3 ov. ♀ 6.7 to 8.4 mm; 2 ♀ 4.5 and 7.0 mm (MNHN-Ga 3340). — Stn 1148, 220 m : 2 ov. ♀ 6.3 and 7.0 mm; 1 ♀ 4.8 mm (MNHN-Ga 3341).

BIOCAL : stn 110, 275 m : 1 ♂ 7.8 mm (MNHN-Ga 3023).

MUSORSTOM 4 : stn 149, 165 m : 7 ♂ 5.2 to 8.2 mm; 1 ♀ 8.2 mm (MNHN-Ga 3342). — Stn 151, 200 m : 8 ♂ 6.0 to 7.5 mm; 2 ov. ♀ 6.5 and 6.7 mm; 7 ♀ 4.0 to 7.8 mm (MNHN-Ga 3024). — Stn 152, 223 m : 4 ♂ 4.6 to 7.9 mm; 1 ov. ♀ 8.5 mm; 2 ♀ 5.1 and 7.2 mm (MNHN-Ga 3025). — Stn 184, 260 m : 1 ♂ 7.0 mm; 2 ov. ♀ 7.5 and 8.6 mm (MNHN-Ga 3343). — Stn 186, 205 m : 5 ♂ 7.4 to 9.0 mm; 4 ov. ♀ 7.2 to 9.1 mm; 2 ♀ 5.6 and 8.2 mm (MNHN-Ga 3026). — Stn 189, 215 m : 5 ♂ 7.8 to 9.8 mm; 2 ov. ♀ 7.3 and 8.2 mm (MNHN-Ga 3344).

SMIB 6 : stn 106, 165-195 m : 1 ♂ 7.5 mm; 1 ov. ♀ 8.9 mm (MNHN-Ga 3027). — Stn 107, 195-205 m : 1 ♂ 8.6 mm (MNHN-Ga 3028). — Stn 108, 210-220 m : 1 ov. ♀ 8.1 mm (MNHN-Ga 3029). — Stn 110, 225-230 m : 1 ov. ♀ 9.2 mm (MNHN-Ga 3030). — Stn 112, 220-225 m : 1 ov. ♀ 8.3 mm (MNHN-Ga 3031). — Stn 127, 190-205 m : 4 ov. ♀ 7.3 to 8.9 mm (MNHN-Ga 3032). — Stn 128, 205-215 m : 2 ♂ 9.2 and 9.6 mm; 2 ov. ♀ 8.8 and 8.9 mm; 1 ♀ 8.0 mm (MNHN-Ga 3033).

TYPES. — The ovigerous female of 7.8 mm from LAGON, Stn 538 (MNHN-Ga 3021) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Nereids of the Greek mythology (Sao).

DESCRIPTION. — Carapace with secondary striae. Intestinal region without scales. External orbital spine long, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth to sixth thoracic sternites with

Source : MNHN, Paris

some short arcuate striae. Second abdominal segment unarmed. Second to fifth segments each with several transverse continuous striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 2/5 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) nearly reaching end of cornea, with 2 subequal distal spines. First segment of antennal peduncle with long distomesial spine reaching end of third segment; distomesial spine on second segment exceeding antennal peduncle. Extensor margin of merus of third maxilliped with small distal spine. Movable and fixed fingers of cheliped with a row of spines along mesial and lateral borders respectively. Dactylus of walking legs 2/3 propodus length, with spinules along ventral margin, distal third unarmed.

REMARKS. — *M. sao* is closely related to *M. spilota* sp. nov. from New Caledonia and Matthew and Hunter Islands, but they differ in several aspects (see Remarks under that species).

M. sao is also close to *M. runcinata* sp. nov. from New Caledonia and Loyalty Islands. They differ in the following aspects :

— The dorsal surface of the carapace bears only a row of epigastric spines in *M. runcinata*, whereas in *M. sao* there are also parahepatic, anterior branchial and postcervical spines.

— The thoracic sternites bear more striae in *M. sao* than in *M. runcinata*.

— The movable and fixed fingers of the cheliped bear a row of spines along mesial and lateral borders in *M. sao*, whereas in *M. runcinata* the movable finger of the cheliped bears one basal and one subterminal spine and the fixed finger only bears 2 subterminal spines.

SIZE. — The males examined ranged between 4.6 and 9.8 mm, females between 4.0 and 9.2 mm; ovigerous females from 6.3 mm.

DISTRIBUTION. — New Caledonia, between 165 and 260 m.

Munida semoni Ortmann, 1894

Munida semoni - MACPHERSON & BABA, 1993 : 386 (key), 411, fig. 17 (references).

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn 108, 335 m : 2 ♂ 8.6 and 10.0 mm; 2 ov. ♀ 7.6 and 8.7 mm; 1 ♀ 8.6 mm (MNHN-Ga 3034).

REMARKS. — This species is only known by one male (5.5 mm) collected in Ambon, Indonesia (see MACPHERSON & BABA, 1993). The specimens caught in New Caledonia agree quite well with the lectotype of *M. semoni*. Moreover, the movable and fixed fingers of the chelipeds have one row of spines along the mesial and lateral borders, respectively. The chelipeds are lost in the lectotype, although the illustration of ORTMANN (1894) shows the movable finger unarmed. In spite of this difference, the specimens from New Caledonia are identified as *M. semoni*. The discovery of topotypic specimens would be desirable in order to clarify the true identity of the present material, because the presence or absence of a row of spines on the fingers of the chelipeds is considered to be of specific importance in the species of the genus *Munida*.

The depth of the type locality is unrecorded. The present material was caught at 335 m.

Munida soelae Baba, 1986

Munida soelae Baba, 1986a : 2, fig. 3; 1988 : 82 (key).
Munida sp. - BABA, 1986c : 175, 292, fig. 126.

MATERIAL EXAMINED. — **New Caledonia**. CHALCAL 2 : stn 74, 650 m : 2 ♀ 5.3 and 5.9 mm (MNHN-Ga 3035). — Stn 75, 600 m : 1 ♂ 6.6 mm; 1 ♀ 6.1 mm (MNHN-Ga 3036).
SMIB 3 : stn 2, 530 m : 1 ♂ 8.4 mm (MNHN-Ga 3037).

REMARKS. — The specimens from New Caledonia agree with the description and figures provided by BABA (1986 a, c). However, the number of spines on the posterior border of the carapace and on the branchiocardiac area

Source : MNHN, Paris

presents a certain degree of variation : 4-6 and 2-4 respectively in the New Caledonian specimens, whereas the types have 6 and 2 respectively.

DISTRIBUTION. — North-West Australia and New Caledonia, between 450 and 600 m.

Munida sphecia sp. nov.

Figs 50, 95

MATERIAL EXAMINED. — **New Caledonia.** *"Vauban"* : stn D 4, 400 m : 1 ♂ 9.3 mm (MNHN-Ga 3044). — Stn CB 105, 360 m : 4 ♂ 10.4 to 13.2 mm; 1 ov. ♀ 12.4 mm; 3 ♀ 12.6 to 15.2 mm (MNHN-Ga 3043). — Stn without n°, 13.04.1978, île des Pins, 400 m : 1 ♂ 14.4 mm; 2 ov. ♀ 14.2 and 15.0 mm (MNHN-Ga 3041, 3042).

BIOCAL : stn 38, 360 m : 1 ♀ 9.0 mm (MNHN-Ga 3045). — Stn 45, 430-465 m : 1 ♂ 15.6 mm (MNHN-Ga 3046).

MUSORSTOM 4 : stn 148, 59 m : 1 ♂ 10.6 mm (MNHN-Ga 3047). — Stn 193, 430 m : 5 ♂ 10.4 to 15.7 mm; 11 ov. ♀ 10.4 to 13.9 mm; 2 ♀ 9.5 and 10.4 mm (MNHN-Ga 3048). — Stn 212, 375-380 m : 2 ♀ 6.7 and 13.6 mm (MNHN-Ga 3049). — Stn 213, 405-430 m : 5 ♂ 10.6 to 18.4 mm; 3 ov. ♀ 11.1 to 14.6 mm; 6 ♀ 9.7 to 15.6 mm (MNHN-Ga 3050, 3051). — Stn 214, 425-440 m : 4 ♂ 10.0 to 18.1 mm; 6 ov. ♀ 11.4 to 17.1 mm; 2 ♀ 9.4 and 10.0 mm (MNHN-Ga 3052). — Stn 215, 485-520 m : 1 ♂ 11.9 mm; 2 ♀ 10.5 and 11.0 mm (MNHN-Ga 3053). — Stn 222, 410-440 m : 3 ♂ 11.8 to 14.7 mm : 2 ov. ♀ 9.3 and 10.0 mm (MNHN-Ga 3345). — Stn 226, 390 m : 1 juv. 5.0 mm (MNHN-Ga 3346).

SMIB 1 : stn 2, 415 m : 2 ♂ 11.7 and 12.0 mm (MNHN-Ga-3038). — Stn 9, 450 m : 1 ♂ 13.6 mm; 1 ov. ♀ 14.7 mm; 2 ♀ 16.8 and 16.9 mm (MNHN-Ga 3039). — Stn 10, 395-410 m : 1 ov. ♀ 14.2 mm; 1 ♀ 11.6 mm (MNHN-Ga 3040).

CHALCAL 2 : stn 82, 304 m : 1 ♂ 15.0 mm (MNHN-Ga 3396).

SMIB 2 : stn 3, 428 m : 2 ♂ 11.1 and 14.5 mm; 3 ov. ♀ 13.2 to 13.7 mm; 3 ♀ 9.0 to 15.3 mm (USNM). — Stn 5, 398-410 m : 1 ♂ 15.3 mm; 1 ♀ 14.7 mm (MNHN-Ga 3055). — Stn 6, 442-460 m : 5 ♂ 9.4 to 17.0 mm; 1 ov. ♀ 11.0 mm; 2 ♀ 8.2 and 12.0 mm (USNM). — Stn 9, 475-500 m : 1 ♂ 12.8 mm; 1 ov. ♀ 16.7 mm (MNHN-Ga 3057).

SMIB 4 : stn 36, 530 m : 1 ♀ 6.0 mm (MNHN-Ga 3397). — Stn 66, 430 m : 1 ♂ 13.5 mm (MNHN-Ga 3062). — Stn 68, 430-440 m : 1 ♂ 13.4 mm (MNHN-Ga 3063).

SMIB 5 : Banc Alis, 13.09.1985, 250 m : 1 ♂ 5.0 mm (MNHN-Ga 3064). — Stn 86, 320 m : 1 ov. ♀ 12.3 mm (MNHN-Ga 3065). — Stn 88, 350 m : 1 ♂ 17.0 mm (MNHN-Ga 3066). — Stn 97, 300 m : 2 ♂ 8.6 and 13.2 mm; 1 ov. ♀ 13.2 mm (MNHN-Ga 3067). — Stn 104, 305-335 m : 2 ♂ 5.7 and 7.0 mm (MNHN-Ga 3347).

AZTÈQUE : stn 11, 340-360 m : 1 ov. ♀ 12.3 mm (MNHN-Ga 3068).

Loyalty Islands. MUSORSTOM 6 : stn 406, 373 m : 3 ♂ 10.8 to 15.6 mm; 1 ov. ♀ 11.8 mm (MNHN-Ga 3058). — Stn 460, 420 m : 1 ♂ 15.6 mm; 1 ♀ 15.2 mm (MNHN-Ga 3059). — Stn 464, 430 m : 2 ♂ 12.2 and 13.0 mm (MNHN-Ga 3060). — Stn 472, 300 m : 1 ov. ♀ 13.7 mm (MNHN-Ga 3061).

Chesterfield Islands. CHALCAL 1 : stn 8, 348 m : 2 ♂ 11.4 and 11.6 mm; 3 ov. ♀ 11.0 to 12.8 mm (MNHN-Ga 3069).

MUSORSTOM 5 : stn 299, 360-390 m : 1 ♂ 24.0 mm (MNHN-Ga 3394). — Stn 300, 450 m : 1 ♂ 15.2 mm; 3 ♀ 9.0 to 10.1 mm (MNHN-Ga 3070). — Stn 306, 375-415 m : 1 ♀ 6.0 mm (MNHN-Ga 3395). — Stn 332, 400 m : 2 ♀ 10.8 and 11.7 mm (MNHN-Ga 3071). — Stn 378, 355 m : 1 ♀ 9.3 mm (MNHN-Ga 3072).

TYPES. — One male of 18.1 mm from MUSORSTOM 4, Stn 213 (MNHN-Ga 3050) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *sphex*, wasp, in reference to the yellow and purple bands of the carapace.

DESCRIPTION. — Carapace with numerous secondary striae. Gastric region with 2 epigastric spines behind supraoculars. One postcervical spine on each side, occasionally two. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 3 spines. Thoracic sternites with numerous arcuate striae. Abdominal segments with numerous striae. Second segment with 6 spines on anterior transverse ridge; third segment with 4 spines; anterior ridge of fourth segment with 2 spines; posterior ridge unarmed. Males with gonopods absent from first abdominal segment. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment (distal spines excluded) slightly exceeding end of cornea, distomesial spine distinctly longer than distolateral. First antennal segment moderately produced on inner margin, slightly exceeding second segment; distomesial spine on second segment exceeding antennal peduncle, one additional spine on mesial border, located at midlength of segment; third segment unarmed. Merus of third maxilliped bearing median spine on flexor margin; small distomarginal spine on extensor

Source : MNHN, Paris

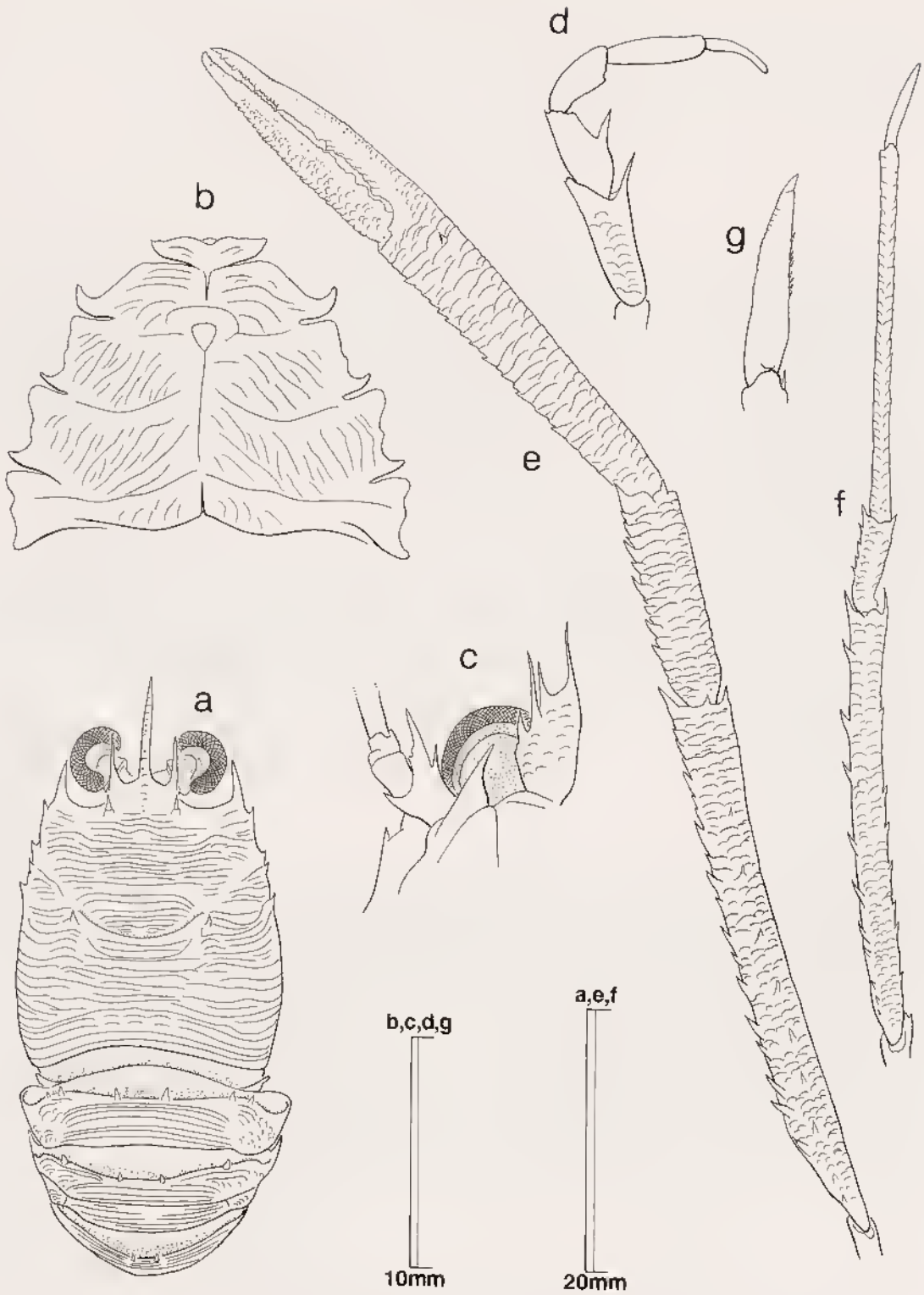

FIG. 50. — *Munida sphecia* sp. nov., ♂ 18.1 mm, holotype from Stn 213 (MUSORSTOM 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

border. Mesial border of movable finger of cheliped denticulated; tip of fixed finger bifid. Dactylus of walking legs about 1/4 propodus length, with numerous median spinules on ventral border.

COLOUR. — Carapace with wide transverse yellow and purple bands. Epigastric region and cervical groove with purple band; cardiac region and lateral parts of branchial regions yellow; center parts of branchial regions and intestinal region purple. Rostrum and supraocular spines yellow. Second and third abdominal segments with yellow and purple bands. Chelipeds and walking legs with transverse whitish and red bands; distal part of fingers of chelipeds whitish, proximal part red; dactylus of walking legs whitish.

REMARKS. — *M. sphecia* is very close to *M. tenuipes* Baba & Miyake, 1967, from Japan (MIYAKE & BABA, 1967a), both species can be distinguished by small but constant differences :

— The anterior margin of the third thoracic sternite is distinctly bilobated in *M. sphecia*, very weakly in *M. tenuipes*.

— The distomesial spine on the basal antennal segment is long, exceeding the antennal peduncle in *M. tenuipes;* this spine is distinctly shorter in *M. sphecia*, and slightly exceeds the second antennal segment.

— The mesial margin of the second antennal segment is only armed with one distal spine in *M. tenuipes*. *M. sphecia* has one distomesial and one additional spine on its base.

The new species is also close to *M. sabatesae* sp. nov. from New Caledonia and New Hebrides Islands. They differ in several constant characters :

— The branchial margin in *M. sphecia* bears 3 spines, 4 in *M. sabatesae*.

— Usually there is one postcervical spine in *M. sphecia*, 2 spines in *M. sabatesae*.

— The second abdominal segment has 6 spines on the anterior ridge in *M. sphecia*, 4 spines in *M. sabatesae*.

— The third antennal segment has a well developed distomesial spine in *M. sabatesae*, absent in *M. sphecia*.

— The propodus of the walking legs are less than 3 times longer than the dactylus in *M. sabatesae*, being about 4 times in *M. sphecia*.

SIZE. — The males examined ranged between 5.0 and 24.0 mm, females between 6.0 and 17.1 mm; ovigerous females from 9.3 mm.

DISTRIBUTION. — New Caledonia, Loyalty Islands and Chesterfield Islands, between 59 and 520 m.

Munida spilota sp. nov.

Figs 51, 84

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 207, 220-235 m : 1 ♂ 8.6 mm (USNM).
SMIB 4 : stn 42, 320 m : 2 ♂ 7.6 and 7.7 mm (MNHN-Ga 3074, 3511).
Matthew and Hunter Islands. VOLSMAR : stn 7, 400 m : 1 ♂ 6.7 mm (MNHN-Ga 3075).

TYPES. — The male of 6.7 mm from VOLSMAR, Stn 7 (MNHN-Ga 3075) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *spilos*, spot, fleck, in reference to the colour pattern of the species.

DESCRIPTION. — Carapace with secondary striae. Intestinal region with one scale. External orbital spine situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh sternites smooth. Second abdominal segment with 2 spines on each side of anterior ridge. Second to fifth segments each with several transverse continuous striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, with 2 subequal distal spines. First segment of antennal peduncle with long distomesial spine reaching end of third segment; distomesial spine on second segment exceeding antennal peduncle. Extensor border

Source : MNHN, Paris

of merus of third maxilliped with distal spine. Movable finger of cheliped with one basal and one distal spines; fixed finger with a row of spines along lateral border. Dactylus of walking legs 2/3 propodus length, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments pinkish. Red longitudinal rows on dorsal surface of carapace, spines red. Rostrum and external orbital spines pinkish. Lateral parts of second to fourth abdominal segments with red spots; median red spot on fourth and fifth abdominal segment. Chelipeds missing in photographed specimen. Walking legs with transverse whitish and reddish bands; dactylus whitish.

REMARKS. — *Munida spilota* is closely related to *M. runcinata* sp. nov. from New Caledonia and Loyalty Islands. They differ in the following aspects :

— The dorsal surface of the carapace is only armed with epigastric spines in *M. runcinata*, whereas *M. spilota* also has parahepatic and anterior branchial spines.

— The dactylus of the walking legs are unarmed on the terminal third in *M. runcinata*, whereas in *M. spilota* the spinules are along the entire ventral border.

M. spilota is also close to *M. sao* sp. nov. from New Caledonia, but they differ in several features :

— The thoracic sternites are smooth in *M. spilota*, with numerous striae in *M. sao*.

— The movable finger of the cheliped in *M. spilota* bears on the mesial margin only 2 spines (one basal and one subterminal), instead of a row of spines in *M. sao*.

— The dactylus of the walking legs has spines along the entire ventral border in *M. spilota*, unarmed on the terminal third in *M. sao*.

SIZE. — The males examined ranged between 6.7 and 8.6 mm, no females were caught.

DISTRIBUTION. — New Caledonia, Matthew and Hunter Islands, between 220 and 400 m.

Munida spinicordata Henderson, 1885

Fig. 52

Munida spinicordata Henderson, 1885 : 413; 1888 : 146, pl. 15, fig. 3. — BABA, 1988 : 83 (key).

MATERIAL EXAMINED. — **Fiji Islands.** *"Challenger"* : stn 174d, 03.08.1874, 19°05'50"S, 178°16'20"E, 390 m : 1 ♂ 4.0 mm, holotype (BM).

DESCRIPTION.— Carapace with few secondary striae. Gastric region with 2 epigastric spines behind supraoculars. Cardiac region with one strong median spine. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines. Thoracic sternites smooth. Second abdominal segment with 4 spines on anterior transverse ridge; third segment with 4 spines; anterior ridge of fourth segment with 2 spines; posterior ridge with one median spine. Gonopods absent from first segment. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment (distal spines excluded) reaching end of cornea, distomesial spine shorter than distolateral. First antennal segment produced on inner margin, reaching end of antennal peduncle; distomesial spine on second segment reaching end of third segment; third segment with small distomesial spine. Merus of third maxilliped bearing median spine on flexor margin; distomarginal spine on extensor border. Chelipeds missing. Dactylus of walking legs about 1/2 propodus length, without spinules on ventral border.

REMARKS. — Only known from the type specimen. The closest species is *M. squamosa* Henderson, 1885, from Admiralty Islands, Loyalty Islands and New Caledonia (see below) but they are easily distinguishable by the absence of spines on the posterior border of the carapace, the thoracic sternites without striae and the long distomesial spine on the basal antennal segment.

Source : MNHN, Paris

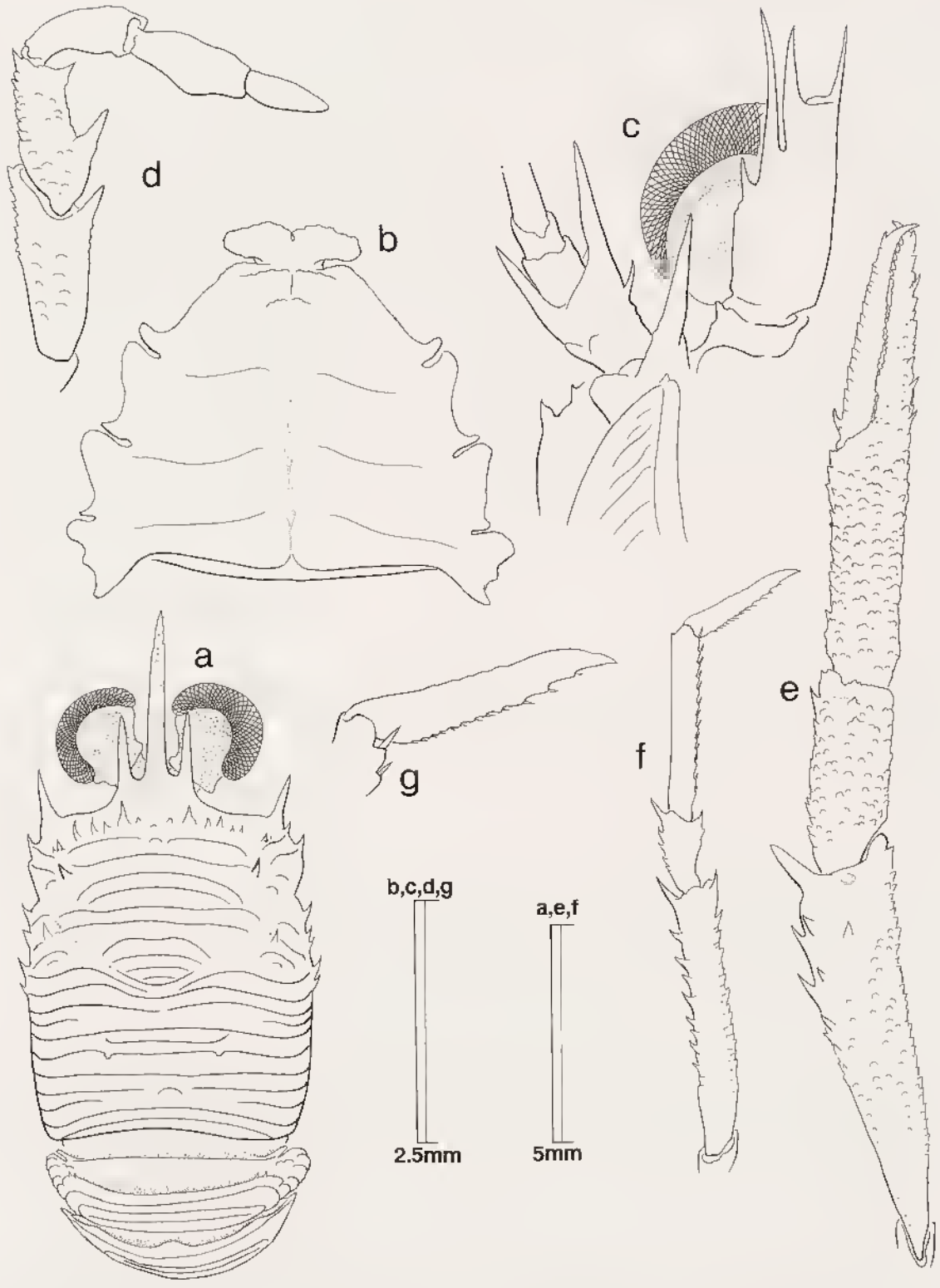

FIG. 51. — *Munida spilota* sp. nov., ♂ 6.7 mm, holotype from Stn 7 (VOLSMAR) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

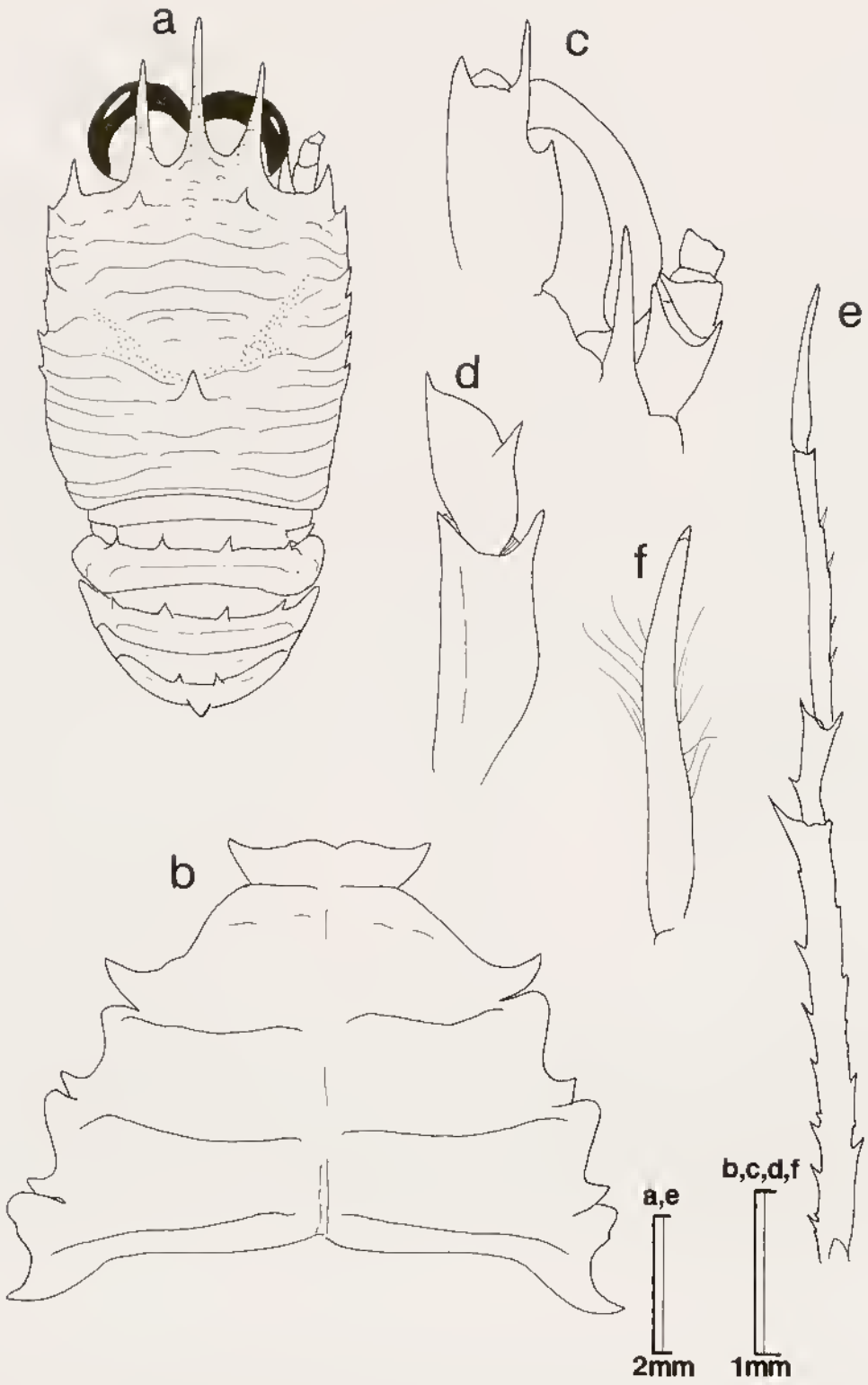

FIG. 52. — *Munida spinicordata* Henderson, 1885, ♂ 4.0 mm, holotype from Stn 174d (*"Challenger"*) : a, carapace, dorsal view; b, sternal plastron; c, ventral view of cephalic region, showing antennular and antennal peduncles; d, right third maxilliped, lateral view; e, right second or third pereiopod, lateral view; f, dactylus of right second or third pereiopod, lateral view.

Source : MNHN, Paris

Munida squamosa Henderson, 1885

Fig. 96

Munida squamosa Henderson, 1885 : 409; 1888 : 131, pl. 13, fig. 1. — MACPHERSON, 1993: 425, fig. 1h-i.
Not *Munida squamosa* - BABA, 1988 : 83 (key), 133 (= *M. analoga* Macpherson, 1993).

MATERIAL EXAMINED. — **New Caledonia.** "*Vauban*" : stn CB 34, 400 m : 1 ov. ♀ 16.0 mm (MNHN-Ga 3076). — Stn without n°, 22° 33.2'S, 166° 25'E, 290-350 m, 06.06.1979 : 1 ov. ♀ 13.5 mm (MNHN Ga 3079).

LAGON : stn 493, 500-535 m : 1 juv. 3.5 mm (MNHN-Ga 3078).

BIOCAL : stn 45, 430-465 m : 2 ♂ 16.0 and 17.0 mm; 1 ov. ♀ 16.3 mm (MNHN-Ga 3077). — Stn 77, 440 m : 1 ♂ 6.7 mm (MNHN-Ga 3348). — Stn 78, 445-450 m : 6 ♂ 8.2 to 15.3 mm; 3 ov. ♀ 11.6 to 16.8 mm; 7 ♀ 6.3 to 10.0 mm (MNHN-Ga 3080). — Stn 109, 495-515 m : 2 ♂ 15.0 and 16.4 mm (MNHN-Ga 3081).

MUSORSTOM 4 : stn 170, 485 m : 4 ♂ 10.0 to 14.7 mm; 11 ov. ♀ 11.3 to 16.4 mm; 6 ♀ 5.3 to 12.8 mm (MNHN-Ga 3082). — Stn 179, 480 m : 5 ♂ 10.0 to 15.2 mm; 5 ov. ♀ 11.7 to 14.2 mm ; 6 ♀ 6.3 to 13.8 mm (MNHN-Ga 3083). — Stn 180, 450 m : 2 ♀ 5.3 and 5.5 mm; 2 juv. 4.3 and 5.1 mm (USNM). — Stn 195, 470 m : 1 ♀ 13.6 mm (MNHN-Ga 3085). — Stn 201, 500 m : 2 ♂ 14.4 and 16.6 mm; 5 ov. ♀ 13.5 to 15.1 mm; 1 juv. 4.6 mm (MNHN-Ga 3086). — Stn 202, 580 m : 1 ♂ 12.5 mm (MNHN-Ga 3087). — Stn 229, 445-460 m : 1 ov. ♀ 11.6 mm (MNHN-Ga 3088). — Stn 236, 495-550 m : 9 ♂ 7.2 to 14.3 mm; 2 ov. ♀ 12.9 and 14.7 mm; 5 ♀ 7.3 to 10.4 mm (MNHN-Ga 2654). — Stn 239, 470-475 m : 1 ♂ 15.0 mm; 2 ov. ♀ 12.3 and 13.4 mm; 3 ♀ 7.2 to 8.2 mm (MNHN-Ga 3089). — Stn 243, 435-450 m : 1 ♂ 5.5 mm; 1 ov. ♀ 12.2 mm; 2 ♀ 5.1 and 7.4 mm (MNHN-Ga 3090). — Stn 247, 435-460 m : 1 ov. ♀ 14.2 mm; 1 ♀ 6.5 mm (MNHN-Ga 3091).

Loyalty Islands. "*Vauban*" : stn 34, 400 m : 1 ♀ 15.4 mm (MNHN-Ga 3077).

MUSORSTOM 6 : stn 415, 461 m : 1 ov. ♀ 13.6 mm (MNHN-Ga 3092). — Stn 465, 480 m : 1 ♂ 15.0 mm; 1 ♀ 12.8 mm (MNHN-Ga 3093). — Stn 467, 575 m : 6 ♂ 9.6 to 16.3 mm; 3 ov. ♀ 11.3 to 14.3 mm; 11 ♀ 8.7 to 15.6 mm (MNHN-Ga 3094).

Admiralty Islands. "*Challenger*" : stn 219, 01°54'00"S, 146°39'40"E, 278 m, 10.3.1875 : 2 ♂ 8.4 and 10.3 mm; 1 ov. ♀ 10.8 mm, types (BM).

REMARKS. — The material from New Caledonia agrees quite well with type specimens from Admiralty Islands. The colour pattern is as follows : Ground colour of carapace and abdomen orange; yellow spots on gastric and cardiac regions; epigastric and mesogastric regions purple; dark orange spots on abdominal segments. Chelipeds and walking legs with red and whitish bands; terminal third of palm and proximal third of fingers of chelipeds red; distal part of dactylus of walking legs red.

SIZE. — The males examined ranged between 5.5 and 17.0 mm, females between 5.1 and 16.4 mm; ovigerous females from 10.8 mm.

DISTRIBUTION. — Admiralty Islands, New Caledonia and Loyalty Islands, between 278 and 580 m.

Munida stia sp. nov.

Fig. 53

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 38, 360 m : 1 ♂ 3.6 mm (MNHN-Ga 3095) — Stn 44, 440-450 m : 2 ♂ 2.8 and 3.0 mm (USNM). — Stn 66, 505-515 m : 4 ♂ 3.8 to 5.5 mm (MNHN-Ga 3349).

Chesterfield Islands. MUSORSTOM 5 : stn 301, 487-610 m : 1 ♂ 4.2 mm (MNHN-Ga 3097). — Stn 305, 430-440 m : 2 ♂ 3.5 and 4.5 mm (MNHN-Ga 3098). — Stn 339, 380-395 m : 3 ♂ 4.3 and 4.6 mm; 1 ov. ♀ 4.0 mm (MNHN-Ga 3099 and USNM). — Stn 361, 400 m : 1 ♂ 4.3 mm; 2 ♀ 4.0 and 4.1 mm (MNHN-Ga 3100). — Stn 362, 410 m : 1 ♂ 3.8 mm (MNHN-Ga 3101).

TYPES. — The male of 3.6 mm from BIOCAL, Stn 38 (MNHN-Ga 3095) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *stia*, small stone, in reference to the small size of the species. The name is considered as a substantive in apposition.

DESCRIPTION . — Carapace with few secondary striae. Intestinal region without scales. External orbital spine short, situated at anterolateral angle of carapace. Branchial margin with 5 small spines. Fourth thoracic sternite

Source : MNHN, Paris

with few short arcuate striae; fifth to seventh smooth. Abdominal segments unarmed. Second to fifth segments each with one transverse continuous stria. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) not exceeding cornea, distomesial spine shorter than distolateral. First segment of antennal peduncle with distomesial spine not reaching end of second segment; distomesial spine on second segment exceeding third segment. Extensor margin of merus of third maxilliped with small distal spine. Fixed and movable fingers of cheliped with a row of spines along lateral and mesial borders, respectively. Dactylus of walking legs 2/3 propodus length, with spinules along ventral margin, terminal third unarmed.

REMARKS. — *M. stia* is closely related to *M. leptitis* sp. nov. from New Caledonia and Loyalty Islands and they differ in several features :

— The movable finger of the cheliped has one basal spine in *M. leptitis*, whereas in *M. stia* there is a row of spines along the mesial margin.

— The dactylus of the walking legs have spines along the entire ventral border in *M. leptitis*, unarmed on the terminal third in *M. stia*.

SIZE. — The males examined ranged between 2.8 and 5.5 mm, females between 4.1 and 4.6 mm; ovigerous female from 4.0 mm.

DISTRIBUTION. — New Caledonia and Chesterfield Islands, between 360 and 610 m.

Munida stigmatica sp. nov.

Figs 54, 85

MATERIAL EXAMINED. — **New Caledonia.** Stn without position, 250 m, 13.09.1985: 4 ♂ 4.0 to 8.2 mm; 4 ov. ♀ 8.2 to 9.0 mm; 4 ♀ 4.9 to 7.5 mm (MNHN-Ga 3353).

MUSORSTOM 4 : stn 182, 305 m : 2 ♂ 7.5 and 9.0 mm; 1 ov. ♀ 6.8 mm (MNHN-Ga 3354).

CHALCAL 2 : stn 19, 271 m : 5 ♂ 5.6 to 10.1 mm (MNHN-Ga 3103). — Stn 78, 233-360 m : 1 ♂ 11.8 mm; 2 ♀ 5.5 and 5.7 mm (USNM).

SMIB 3 : stn 18, 338 m : 1 ♂ 10.6 mm (MNHN-Ga 3105).

SMIB 5 : stn 84, 290 m : 1 ♂ 8.4 mm (MNHN-Ga 3106). — Stn 86, 320 m : 1 ♂ 8.5 mm (MNHN-Ga 3350). — Stn 87, 335-370 m : 1 ♂ 3.8 mm; 1 ♀ 5.0 mm (MNHN-Ga 3351). — Stn 97, 300 m : 1 ♂ 10.0 mm; 1 ov. ♀ 9.0 mm; 1 ♀ 9.5 mm (MNHN-Ga 3352).

Matthew and Hunter Islands. VOLSMAR : stn 7, 400 m : 1 ♂ 7.5 mm (MNHN-Ga 3107).

Chesterfield Islands. CHALCAL 1 : stn 67, 277 m : 1 ov. ♀ 6.1 mm (MNHN-Ga 3108).

MUSORSTOM 5 : stn 273, 290 m : 2 ♂ 4.2 and 4.9 mm (MNHN-Ga 3109). — Stn 280, 270 m : 1 ♂ 5.3 mm (MNHN-Ga 3110). — Stn 299, 360-390 m : 10 ♂ 4.0 to 7.8 mm; 7 ov. ♀ 4.7 to 6.0 mm; 1 ♀ 5.0 mm (MNHN-Ga 3111). — Stn 302, 345-360 m : 2 ♂ 3.4 and 5.5 mm; 1 ♀ 4.2 mm (MNHN-Ga 3112).

TYPES. — The male of 10.6 mm from SMIB 3, Stn 18 (MNHN-Ga 3105) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *stigma*, mark, in reference to the spots on the carapace and pereiopods.

DESCRIPTION. — Carapace with secondary striae between principal striae. Intestinal region without scales. External orbital spine situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth and fifth thoracic sternites with few short arcuate striae; lateral parts of seventh sternite with small granules. Second abdominal segment with 2 spines on each side of anterior ridge. Second to fourth segments each with several transverse continuous striae. Eye large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) slightly exceeding cornea, distomesial spine longer than distolateral. First segment of antennal peduncle with long distomesial spine reaching end of third segment; distomesial spine on second segment exceeding antennal peduncle. Extensor border of

Source : MNHN, Paris

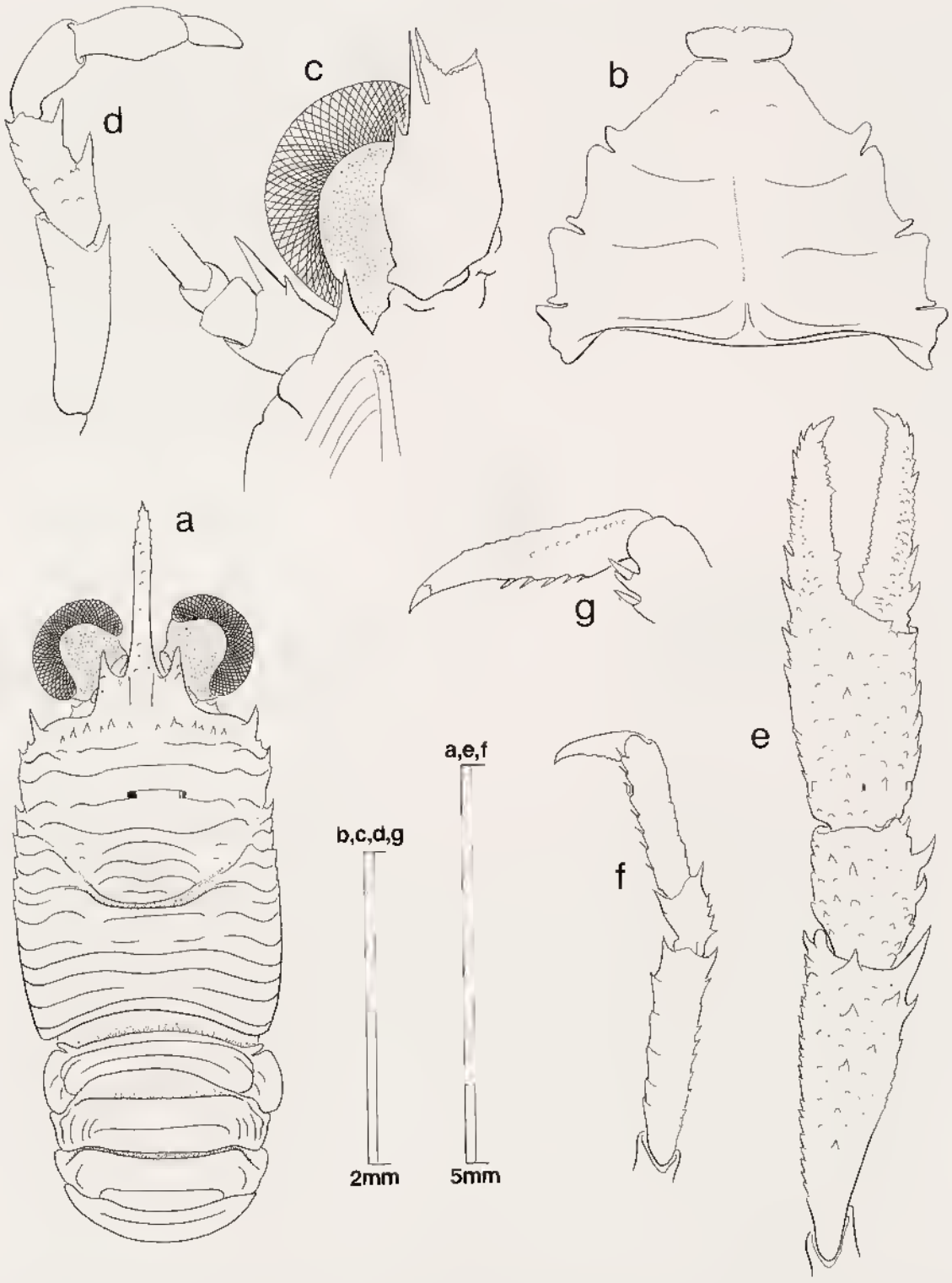

FIG. 53. — *Munida stia* sp. nov., ♂ 3.6 mm, holotype from Stn 38 (BIOCAL) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, left first walking leg, lateral view; **g**, dactylus of left first walking leg, lateral view.

Source : MNHN, Paris

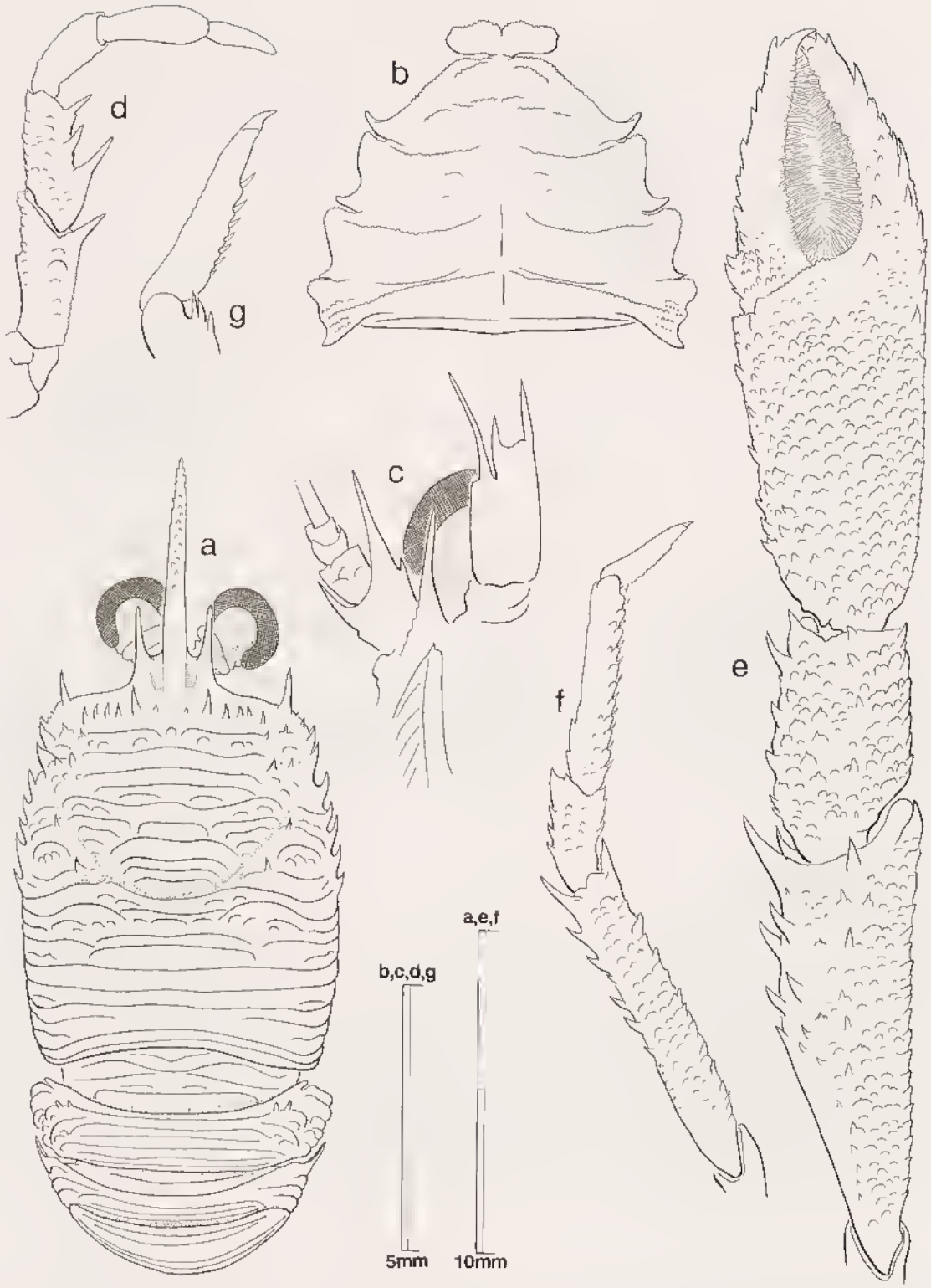

FIG. 54. — *Munida stigmatica* sp. nov., ♂ 10.6 mm, holotype from Stn 18 (SMIB 3) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

merus of third maxilliped with a small distal spine. Fixed and movable fingers of cheliped with a row of spines along lateral and mesial borders, respectively. Dactylus of walking legs half as long as propodus, with movable spinules along ventral margin, distal third unarmed.

COLOUR. — Ground colour of carapace and abdominal segments light orange, striae reddish. Rostrum and supraocular spines red. Ground colour of chelipeds and walking legs whitish, spines and some granules reddish. Distal half of chelipeds with red spots, tip white. Dactylus of walking legs whitish.

REMARKS. — *M. stigmatica* belongs to the group of species with 5 spines on each branchial margin and the second abdominal segment unarmed or with spines on both sides of the anterior ridge. However, the new species is easily differentiable from the other species of this group by the presence of granules on the lateral parts of the seventh thoracic sternite.

SIZE. — The males examined ranged between 3.4 and 11.8 mm, females between 4.2 and 9.5 mm; ovigerous female from 4.7 mm.

DISTRIBUTION. — New Caledonia, Matthew and Hunter Islands and Chesterfield Islands, between 233 and 400 m.

Munida taenia sp. nov.

Figs 55, 86

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4 : stn 212, 375-380 m : 1 ov. ♀ 6.5 mm (MNHN-Ga 3355). — Stn 227, 320 m : 1 ♀ 4.6 mm (MNHN-Ga 3113). — Stn 234, 350-365 m : 1 ♂ 4.5 mm; 1 ov. ♀ 6.0 mm; 4 ♀ 3.0 to 4.5 mm (MNHN-Ga 3356).

CHALCAL 2 : stn 26, 296 m : 5 ♂ 8.1 to 9.0 mm; 1 ov. ♀ 9.6 mm; 2 ♀ 8.5 and 9.0 mm (USNM). — Stn 27, 289 m : 1 ♂ 7.9 mm (MNHN-Ga 3115). — Stn 78, 233-360 m : 3 ♂ 4.8 to 6.5 mm (MNHN-Ga 3116). — Stn 81, 311 m : 1 ♂ 4.1 mm (MNHN-Ga 3117). — Stn 83, 200 m : 3 ♂ 6.4 to 7.7 mm; 2 ov. ♀ 5.3 and 6.9 mm; 1 ♀ 3.8 mm (MNHN-Ga 3118).

SMIB 4 : stn 55, 260 m : 2 ♂ 5.6 and 8.8 mm; 2 ov. ♀ 5.5 and 7.1 mm (MNHN-Ga 3119). — Stn 56, 260 m : 1 ♂ 7.5 mm (MNHN-Ga 3120).

SMIB 5 : stn 70, 260-270 m : 2 ♂ 7.7 and 8.0 mm; 2 ov. ♀ 6.5 and 8.5 mm (MNHN-Ga 3357). — Stn 101, 225-270 m : 6 ♂ 5.0 to 8.0 mm; 7 ov. ♀ 6.0 to 7.5 (MNHN-Ga 3358). — Stn 102, 290-305 m : 7 ♂ 4.2 to 8.5 mm; 5 ov. ♀ 5.5 to 8.2 mm (MNHN-Ga 3359). — Stn 103, 315 m : 3 ♂ 5.8 to 7.6 mm; 6 ov. ♀ 5.2 to 9.0 mm; 2 ♀ 5.2 and 9.0 mm (MNHN-Ga 3204). — Stn 104, 305-335 m : 6 ♂ 5.0 to 8.0 mm; 3 ov. ♀ 6.5 to 8.0 mm (MNHN-Ga 3360).

Chesterfield Islands. CHALCAL 1 : stn 8, 348 m : 1 ♂ 7.1 mm; 2 ov. ♀ 7.0 and 7.8 mm (MNHN-Ga 3121). — Stn 32, 350 m : 1 ov. ♀ 6.8 mm (MNHN-Ga 3122).

MUSORSTOM 5 : stn 339, 380-395 m : 1 ov. ♀ 5.7 mm; 1 ♀ 4.8 mm (MNHN-Ga 3123). — Stn 361, 400 m : 3 ♂ 5.3 to 6.9 mm; 5 ov. ♀ 5.2 to 7.9 mm (MNHN-Ga 3124). — Stn 378, 355 m : 1 ov. ♀ 6.7 mm (MNHN-Ga 3125).

TYPES. — The male of 7.5 mm from SMIB 4, Stn 56 (MNHN-Ga 3120) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — From the Greek, *tainia*, band, in reference to coloured bands of the carapace. The name is considered as a substantive in apposition.

DESCRIPTION. — Carapace with few secondary striae. Intestinal region without scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth and fifth thoracic sternites with few arcuate striae; lateral parts of sixth and seventh thoracic sternites with many small granules. Second abdominal tergite with a row of 6-7 spines on anterior ridge (one specimen with only 2 spines on each side). Second to fourth segments each with several transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, distomesial spine slightly longer than distolateral. First segment of antennal peduncle with long

Source : MNHN, Paris

distomesial spine reaching end of antennal peduncle; distomesial spine on second segment distinctly exceeding antennal peduncle. Extensor border of merus of third maxilliped with distal spine. Movable finger of cheliped with 3 spines on proximal half of mesial margin, and one subdistal spine; fixed finger with a row of spines along lateral border. Dactylus of walking legs less than 1/2 propodus length, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments orange, striae reddish. Rostrum and supraocular spines orange. Chelipeds orange, some spines and granules red; distal part of palm and fingers whitish. Walking legs with transverse whitish and orange bands.

REMARKS. — *M. taenia* is closely related to *M. pontoporea* sp. nov. from New Caledonia, but they differ in several aspects :

— The frontal margin is moderately oblique in *M. pontoporea*, transverse in *M. taenia*.

— The antennular peduncle distinctly exceeds the cornea in *M. pontoporea*, whereas only reaches the end of the cornea in *M. taenia*.

— The merus of the third maxilliped has one distal spine on the extensor border in *M. taenia*, this spine is absent in *M. pontoporea*.

— The dactylus of the walking legs are more longer and slenderer in *M. pontoporea* than in *M. taenia*.

SIZE. — The males examined ranged between 4.1 and 9.0 mm, females between 3.0 and 9.6 mm; ovigerous females from 5.2 mm.

DISTRIBUTION. — New Caledonia and Chesterfield Islands, between 200 and 400 m.

Munida thoe sp. nov.

Figs 56, 87

MATERIAL EXAMINED. — **New Caledonia**. BIOCAL : stn 8, 435 m : 3 ♂ 8.0 to 10.0 mm; 2 ov. ♀ 8.3 and 9.4 mm (MNHN-Ga 3361). — Stn 67, 500 m : 1 ov. ♀ 15.5 mm (MNHN-Ga 3126). — Stn 83, 460 m : 1 ♂ 12.4 mm (MNHN-Ga 3362).

MUSORSTOM 4 : stn 156, 530 m : 3 ♂ 6.8 to 17.1 mm; 1 ov. ♀ 13.2 mm; 3 ♀ 6.4 to 7.3 mm (MNHN-Ga 3363). — Stn 194, 550 m : 11 ♂ 10.2 to 15.2 mm; 5 ov. ♀ 9.1 to 14.0 mm; 5 ♀ 7.5 to 11.5 mm (MNHN-Ga 3128). — Stn 195, 370 m : 2 ♂ 9.7 and 10.3 mm; 3 ov. ♀ 10.4 to 12.0 mm (MNHN-Ga 3129). — Stn 216, 490-515 m : 2 ♂ 15.7 and 18.3 mm; 1 ♀ 10.0 mm (MNHN-Ga 3364)

SMIB 2 : stn 26, 500-535 m : 1 ♂ 19.0 (MNHN-Ga 3130).

CHALCAL 2 : stn 1, 500 m : 16 ♂ 11.0 to 19.7 mm; 7 ov. ♀ 9.6 to 16.0 mm; 3 ♀ 11.3 to 15.0 mm (MNHN-Ga 3131, 3132). — Stn 2, 500-580 m : 3 ♂ 11.2 to 19.0 mm; 3 ov. ♀ 14.5 to 18.0 mm; 2 ♀ 12.6 and 13.6 mm (MNHN-Ga 3133 and USNM). — Stn 21, 500-610 m : 19 ♂ 7.2 to 18.2 mm; 2 ♀ 10.1 and 11.8 mm (USNM). — Stn 73, 573 m : 2 ♂ 9.3 and 12.0 mm; 1 ov. ♀ 9.8 mm (MNHN-Ga 3135). — Stn 75, 600 m : 1 ♂ 6.4 mm; 2 ♀ 5.8 and 7.9 mm (MNHN-Ga 3136).

BIOGEOCAL : stn 291, 510-520 m : 1 ♂ 6.6 mm; 1 ov. ♀ 10.0 mm (MNHN-Ga 3365).

SMIB 3 : stn 1, 520 m : 1 ♂ 11.0 mm; 3 ov. ♀ 8.6 to 14.9 mm (MNHN-Ga 3137). — Stn 2, 530 m : 1 ♂ 12.8 mm (MNHN-Ga 3366). — Stn 3, 513 m : 3 ♂ 5.2 to 11.0 mm; 1 ♀ 5.4 mm (MNHN-Ga 3138). — Stn 4, 530 m : 1 ♂ 16.1 mm; 2 ov. ♀ 15.0 and 16.7 mm (MNHN-Ga 3367).

SMIB 4 : stn 34, 515 m : 1 ♂ 12. 4 mm; 1 ♀ 17.3 mm (MNHN-Ga 3139). — Stn 37, 540 m : 1 ♂ 10.0 mm (MNHN-Ga 3140). — Stn 38, 510 m : 1 ♀ 10.4 mm (MNHN-Ga 3141). — Stn 39, 560 m : 1 ♀ 10.0 mm (MNHN-Ga 3142).— Stn 55, 260 m : 4 ov. ♀ 9.3 to 14.2 mm ; 1 ♀ 7.2 mm (MNHN-Ga 3368).

Matthew and Hunter Islands. VOLSMAR : stn 51, 450 m : 1 ♂ 12.5 mm (MNHN-Ga 3143).

TYPES. — The male of 14.8 mm from CHALCAL 2, Stn 1 (MNHN-Ga 3131) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Oceanids of the Greek mythology (Thoë).

Source : MNHN, Paris

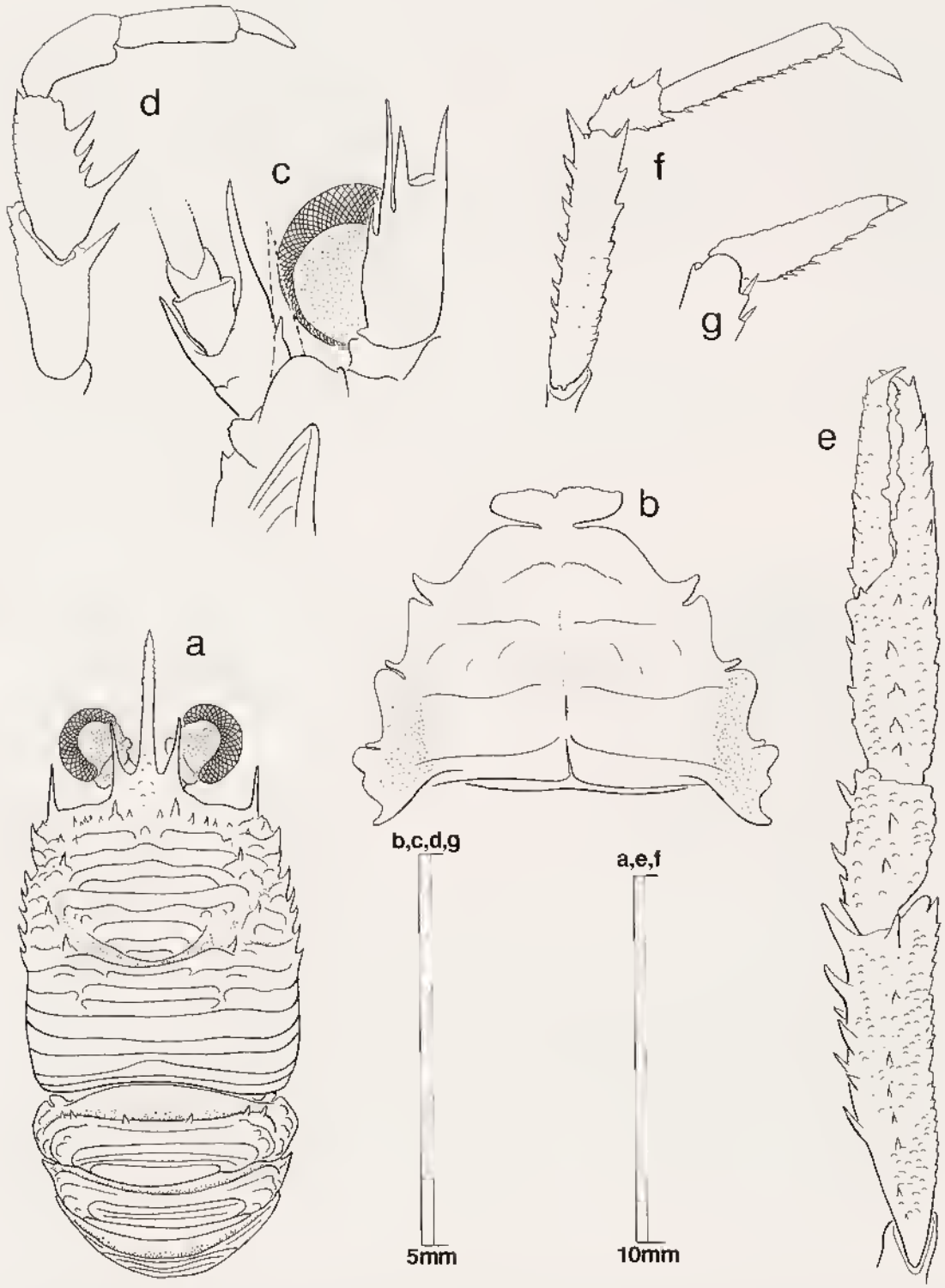

FIG. 55. — *Munida taenia* sp. nov., ♂ 7.5 mm, holotype from Stn 56 (SMIB 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

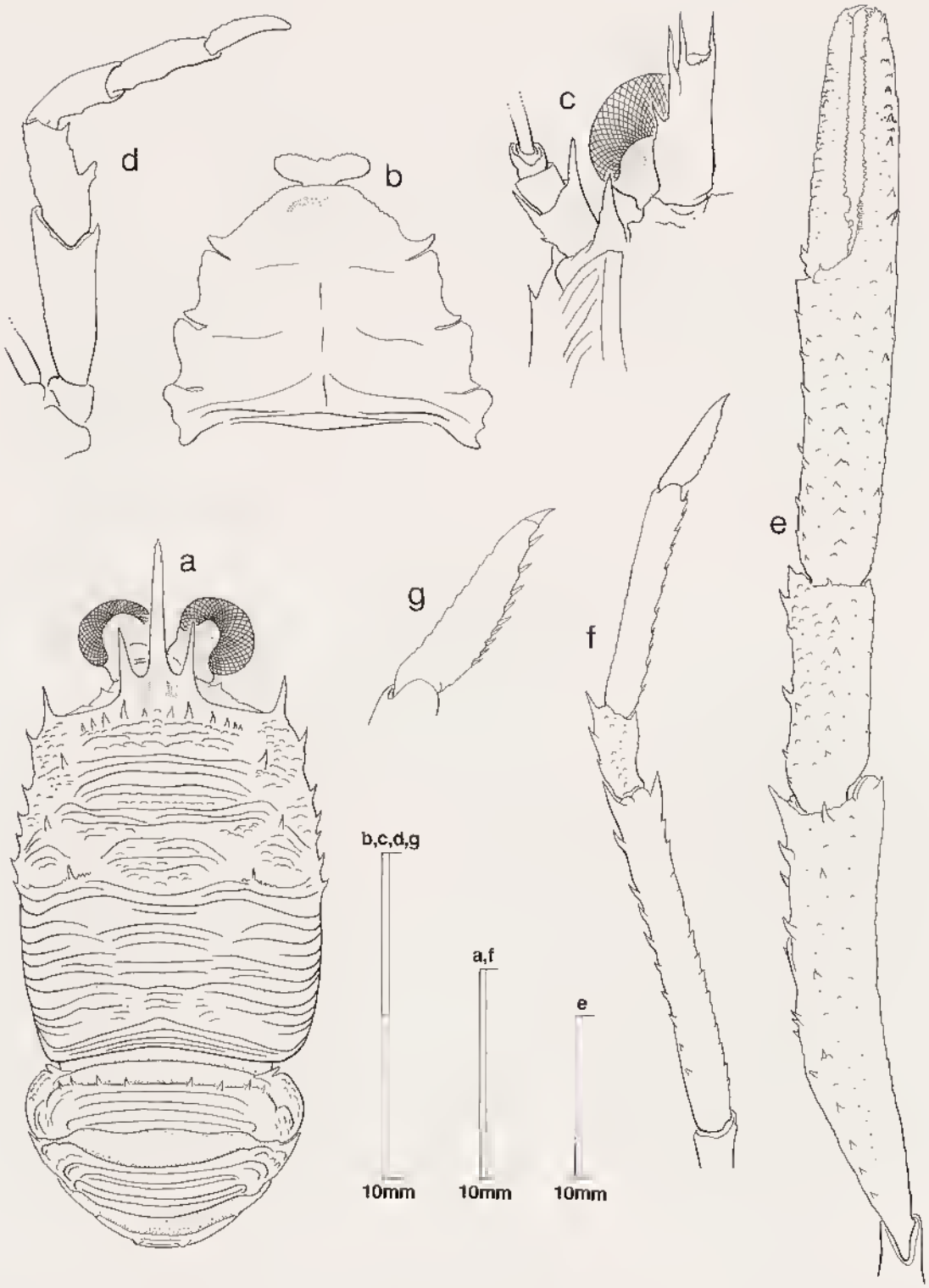

FIG. 56. — *Munida thoe* sp. nov., ♂ 14.8 mm, holotype from Stn 1 (CHALCAL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

DESCRIPTION. — Carapace with numerous secondary striae. Intestinal region with several small scales. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite smooth or with few short arcuate striae; fifth to seventh sternites smooth. Second abdominal tergite with a row of 4 pairs of spines on anterior ridge. Second to fourth segments each with 4-6 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, with 2 subequal distal spines, occasionally distolateral spine slightly longer than distomesial. First segment of antennal peduncle with distomesial spine reaching end of second segment; distomesial spine on second segment not exceeding antennal peduncle. Extensor margin of merus of third maxilliped unarmed. Movable finger of cheliped with one mesial spine near its base; fixed finger with one row of spines along lateral border. Dactylus of walking legs half as long as propodus, with movable spinules along entire ventral margin.

COLOUR. — Ground colour of carapace and abdominal segments orange; epigastric, mesogastric, anterior branchial, anterior part of cardiac and intestinal regions purple. Rostrum, supraocular spines and spines on dorsal surface of carapace orange. Chelipeds and walking legs with transverse whitish and reddish bands. Distal half of fingers of cheliped and dactylus of walking legs whitish.

REMARKS. — *M. thoe* is closely related to *M. elachia* sp. nov. from New Caledonia, and *M semoni* Ortmann from Indonesia and New Caledonia. *M. thoe* is easily differentiable from *M. semoni* by the armature of the dactylus of the walking legs. The ventral margin of the dactylus is unarmed on the terminal third in *M. semoni*, whereas in *M. thoe* the spines are along the entire ventral margin.

M. thoe is easily differentiable from *M. elachia* by the presence of numerous secondary striae on the carapace and abdominal segments and the dactylus of the walking legs, which is half as long as the propodus. In *M. elachia* the secondary striae on the carapace are nearly absent and the second and third abdominal segment each have one transverse stria, furthermore the dactylus of the walking legs is slightly shorter than the propodus. The colour patterns are also different in both species (see Figs 71 and 87).

SIZE. — The males examined ranged between 5.2 and 19.7 mm, females from 5.8 and 18.0 mm; ovigerous females from 8.3 mm.

DISTRIBUTION. — New Caledonia, Matthew and Hunter Islands, between 260 and 610 m.

Munida tiresias sp. nov.

Fig. 57

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 26, 1618-1740 m : 1 ♀ 4.5 mm (MNHN-Ga 3144). — Stn 30, 1140 m : 2 ♀ 4.2 and 5.4 mm (MNHN-Ga 3145). — Stn 68, 1430-1470 m : 1 ♂ 5.4 mm (MNHN-Ga 3146).

BIOGEOCAL : stn 214, 1590-1665 m : 1 ♂ 3.2 mm; 1 ♀ broken (MNHN-Ga 3147).

CALSUB : stn 13, 04.03.1989, 21°26'S, 167°22.7'E, 1567-1807 m : 1 ♂ 5.1 mm (USNM). — Stn 17, 08.03.1989, 21°25'S, 166°24'E, 1753-2049 m : 1 ♀ 2.8 mm (MNHN-Ga 3149).

TYPES. — One male of 5.4 mm from BIOCAL, Stn 68 (MNHN-Ga 3146) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — In reference to the very small eyes. Tiresias is the son of Eueres and Chariclo, who was blinded by Atenea.

DESCRIPTION. — Carapace with gastric region anteriorly elevated. Gastric, hepatic and anterobranchial regions squamate. Transverse ridges on branchial and cardiac regions mostly interrupted. Intestinal region with small scales. Gastric region with a row of epigastric spines, rest of dorsal carapace surface unarmed. External orbital

Source : MNHN, Paris

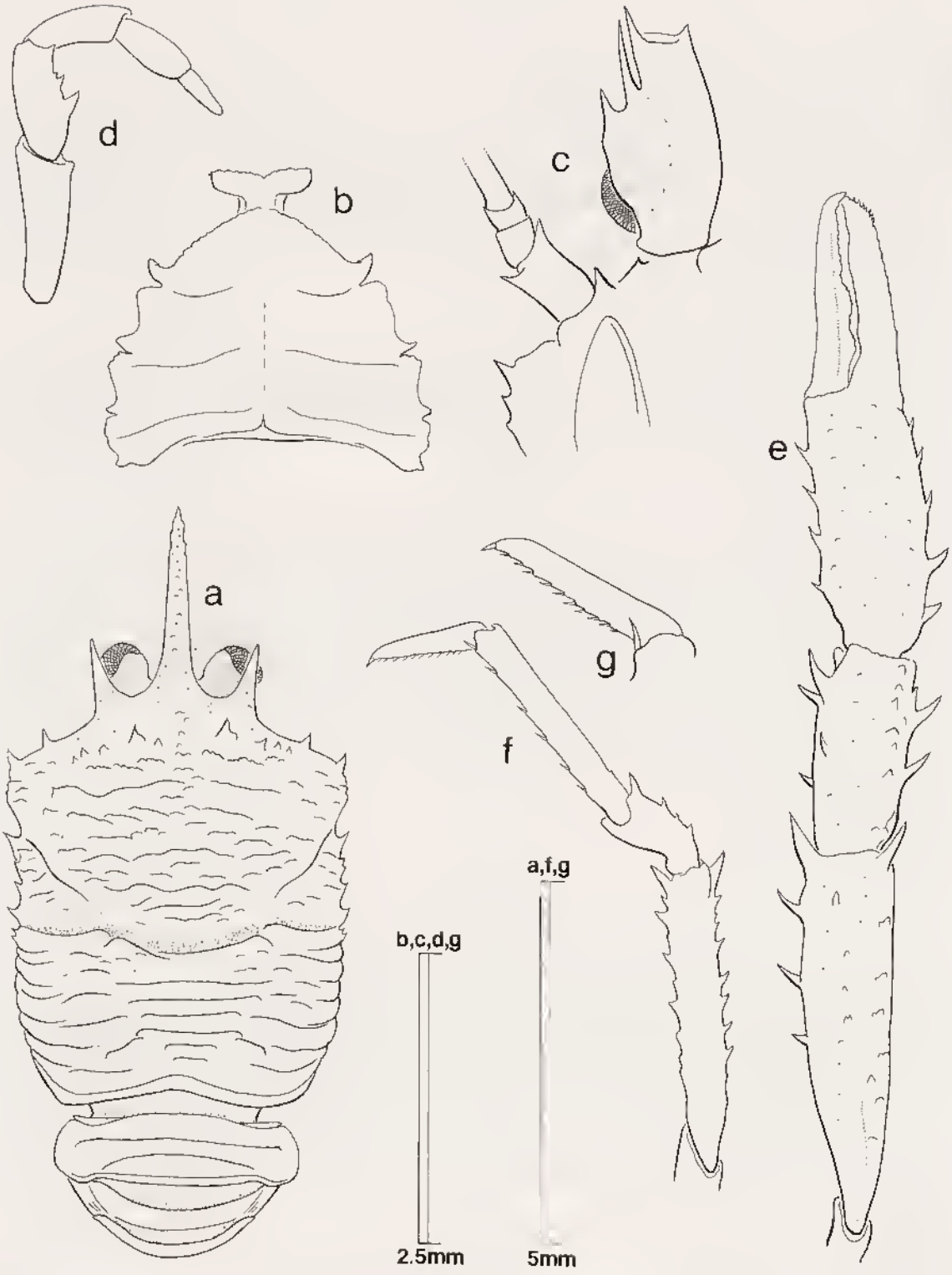

FIG. 57. — *Munida tiresias* sp. nov., ♂ 5.4 mm, holotype from Stn 68 (BIOCAL) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, left first walking leg, lateral view; **g**, dactylus of left first walking leg, lateral view.

Source : MNHN, Paris

spine very small rather mesial to level of second spine; second spine situated at anterolateral angle and similar insize to preceding spine. Branchial margins with 5 small spines. Thoracic sternites smooth. Abdominal segments unarmed. Second abdominal segment with one transverse continuous stria; third to fifth segments without striae. Males with two pairs of gonopods present on first and second abdominal segments. Eyes small, maximum corneal diameter less than 1/5 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) large, distinctly exceeding cornea and reaching lip of rostrum, distomesial spine very small distinctly shorter than distolateral. First segment of antennal peduncle with short distomesial spine distinctly not reaching end of second segment; distomesial spine on second segment not exceeding third segment. Extensor border of merus of third maxilliped unarmed. Chelipeds with iridiscent setae more dense on mesial borders of articles, carpus and palm setose; movable finger unarmed; fixed finger with several small distal spines. Dactylus of walking legs 2/3 propodus length, with movable spinules along entire ventral margin.

REMARKS. — *M. tiresias* is very close to *M. magniantennulata* Baba & Türkay, 1992, from active thermal vent areas in Valu-Fa ridge, Lau Basin (BABA & TURKAY, 1992; BABA & DE SAINT LAURENT, 1992). However, *M. tiresias* has the external orbital and the second lateral spines on the carapace small, subequal, and the first spine is placed on frontal margin, the second is situated at anterolateral angle. In *M. magniantennulata* the first spine is well developed, distinctly longer than the second, and situated at anterolateral angle.

SIZE. — The males examined ranged between 3.2 and 5.4 mm, females between 2.8 and 5.4 mm; no ovigerous females were collected.

DISTRIBUTION. — New Caledonia, between 1140 and 2049 m.

Munida tuberculata Henderson, 1885

Fig. 58

Munida tuberculata Henderson, 1885 : 413; 1888 : 145, pl. 15, fig. 2. — BABA, 1988 : 83 (key).

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 8, 435 m : 1 ov. ♀ 4.7 mm; 1 ♀ 4.0 mm (MNHN-Ga 3150).

CHALCAL 2 : stn 74, 650 m : 1 ♂ 4.8 mm (MNHN-Ga 3151). — Stn 75, 600 m : 1 ♂ 4.6 mm; 2 ov. ♀ 4.3 and 4.4 mm (USNM).

Matthew and Hunter Islands. VOLSMAR : stn 51, 450 m : 1 ov. ♀ 4.7 mm (MNHN Ga 3153). — Stn 52, 510 m : 1 ♀ 4.0 mm (MNHN-Ga 3154).

Fiji. *"Challenger"* : stn 173, 24.07.1874, 19°09'35"S, 179°41'50"E, 583 m : 1 ♂ 5.4 mm; 1 ♀ 3.7 mm, types (BM).

REMARKS. — The material from New Caledonia agrees with the type specimens. The species is again illustrated in order to clarify its taxonomic status. The diagnosis of the species is : carapace granulated in hepatic and anterior branchial regions, epigastric spines granulated. Frontal margins transverse. Rostrum horizontal; supraocular spines short. Branchial margin with 5-6 spines on each side. Thoracic sternites smooth. Second abdominal segment with 3 pairs of spines. Males with two pairs of gonopods on abdominal segments. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Distomesial spine on basal segment of antennular peduncle slightly shorter than distolateral. Antennal peduncle reduced. Extensor border of merus of third maxilliped with small distal spine. Fingers of cheliped granulated; fixed finger with a row of small spines along lateral margin. Dactylus of walking legs half as long as propodus, with a row of spinules along entire ventral border.

SIZE. — The males examined ranged between 4.6 and 5.4 mm; females between 3.7 and 4.7 mm; ovigerous females from 4.3 mm.

DISTRIBUTION. — New Caledonia, Matthew and Hunter Islands, Fiji, between 435 and 650 m.

Source : MNHN, Paris

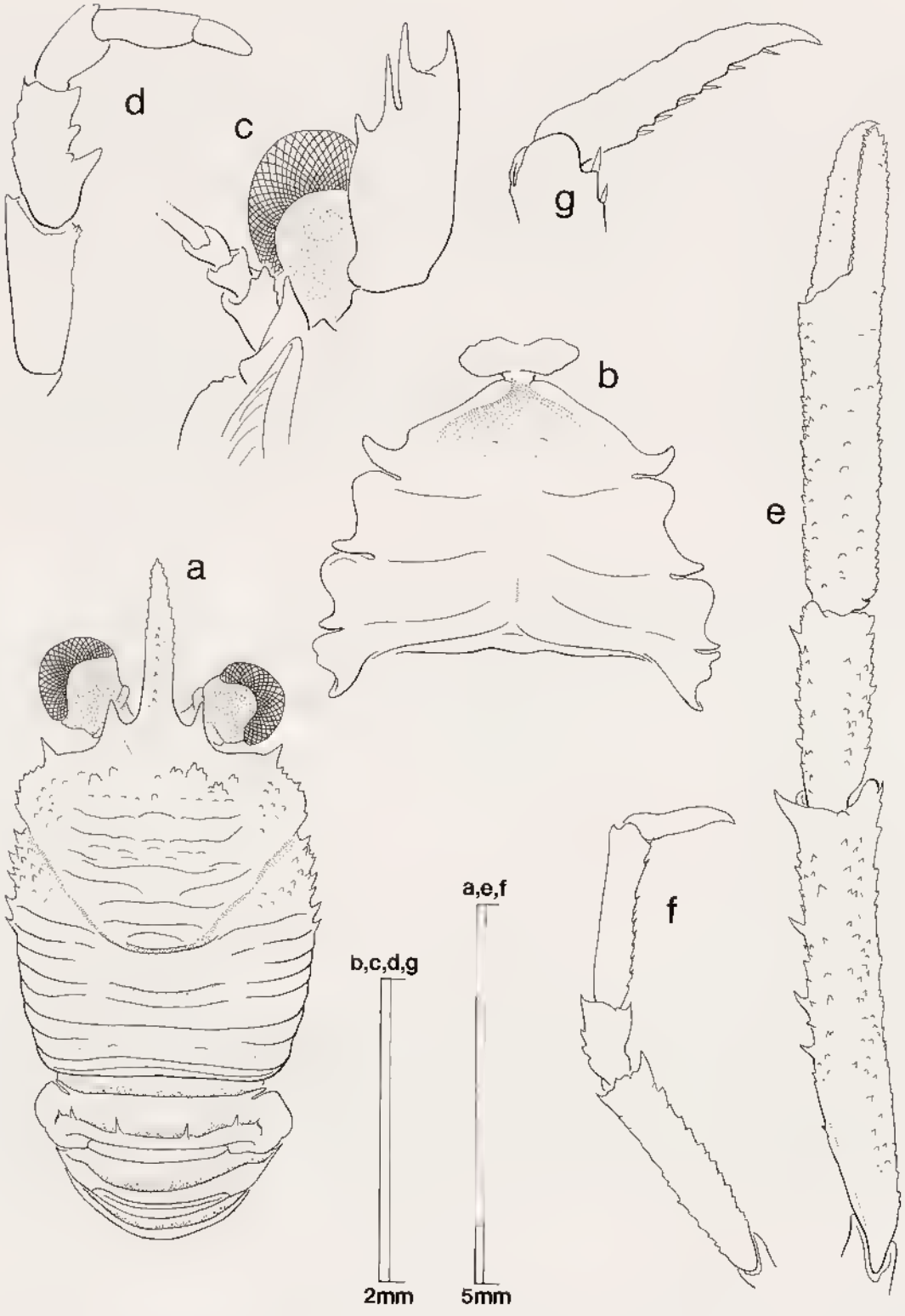

FIG. 58. — *Munida tuberculata* Henderson, 1885 ♂, 4.6 mm, from Stn 75 (CHALCAL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

Munida tyche sp. nov.

Fig. 59

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 84, 150-210 m : 1 ♂ 10.6 mm (MNHN-Ga 3369).

MUSORSTOM 4 : stn 152, 228 m : 1 ♂ 8.3 mm (MNHN-Ga 3155). — Stn 153, 235 m : 5 ♂ 4.2 to 10.4 mm; 2 ov. ♀ 8.6 and 9.0 mm; 4 ♀ 5.5 to 9.0 mm (MNHN-Ga 3156). — Stn 186, 205 m : 1 ♂ 10.6 mm (MNHN-Ga 3157). — Stn 190, 215 m : 2 ♂ 9.6 and 9.8 mm; 1 ov. ♀ 10.2 mm (USNM). — Stn 207, 220-235 m : 1 ♂ 8.7 mm; 1 ♀ 4.4 mm (MNHN-Ga 3159).

SMIB 6 : stn 106, 165-195 m : 1 ♂ 10.4 mm; 1 ov. ♀ 11.3 mm (MNHN-Ga 3162). — Stn 130, 190-205 m : 1 ♂ 7.2 mm; 2 ♀ 5.8 and 6.5 mm (MNHN-Ga 3163).

LAGON : stn 190, 135-150 m : 1 ♂ 10.0 mm (MNHN-Ga 3372). — Stn 370, 127 m : 1 ♂ 6.8 mm (MNHN-Ga 3373). — Stn 1146, 185 m : 1 ♂ 5.5 mm (MNHN-Ga 3371).

Chesterfield Islands. CHALCAL 1 : stn 30, 150-180 m : 1 ♂ 9.7 mm (MNHN-Ga 3164).

CORAIL 2 : stn 129, 215 m : 6 ♂ 5.0 to 7.0 mm; 1 ov. ♀ 6.8 mm; 1 ♀ 7.0 mm (MNHN-Ga 3370). — Stn 131, 215-217 m : 17 ♂ 5.0 to 8.3 mm; 12 ov. ♀ 5.7 to 8.4 mm; 3 ♀ 6.4 to 7.2 mm (MNHN-Ga 3160, 3161).

TYPES. — The male of 7.4 mm from CORAIL 2, Stn 131 (MNHN-Ga 3160) has been selected as holotype; the other specimens are paratypes.

ETYMOLOGY. — The name refers to one of the Oceanids of the Greek mythology (Tyche).

DESCRIPTION.— Carapace with few secondary striae. Striae not interrupted on intestinal region. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 5 spines. Fourth thoracic sternite with few short arcuate striae; fifth to seventh without striae; lateral parts of sixth and seventh thoracic sternites with some coarse granules. Second abdominal tergite with a row of 3-4 pairs of spines on anterior ridge. Second to fourth segments each with 3-4 transverse striae. Males with two pairs of gonopods on first and second abdominal segments. Eye moderately large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) exceeding cornea, with 2 subequal distal spines. First segment of antennal peduncle with long distomesial spine nearly reaching end of third segment; distomesial spine on second segment distinctly exceeding antennal peduncle. Extensor border of merus of third maxilliped with small distal spine. Movable and fixed finger of cheliped with several spines along proximal half of mesial and lateral borders, respectively; one and 2 subdistal spines on movable and fixed finger, respectively. Dactylus of walking legs half as long as propodus, with movable spinules along ventral margin, terminal fourth unarmed.

REMARKS. — *M. tyche* is closely related to *M. idyia* sp. nov. from New Caledonia but they differ in several features :

— The distal spines on the basal antennular segment are subequal in *M. tyche*; whereas the distolateral spine is slightly shorter than the distomesial in *M. idyia*.

— The distomesial spine on the antennal basal segment reachs the end of the antennal peduncle in *M. idyia*, whereas this spine nearly reachs the end of the third segment in *M. tyche*.

— The movable finger of the cheliped has only one basal and one distal spine in *M. idyia*, whereas there are several spines along the first half of the mesial margin in *M. tyche*.

SIZE. — The males examined ranged between 4.2 and 10.6 mm, females between 4.4 and 11.3 mm; ovigerous females from 5.7 mm.

DISTRIBUTION. — New Caledonia and Chesterfield Islands, between 127 and 235 m.

Munida typhle sp. nov.

Fig. 60

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL : stn 62, 1395-1410 m : 1 ♂ 5.6 mm, paratype (MNHN-Ga 3165). — Stn 68, 1430-1470 m : 1 ♂ 6.9 mm, holotype (MNHN-Ga 3166).

Source : MNHN, Paris

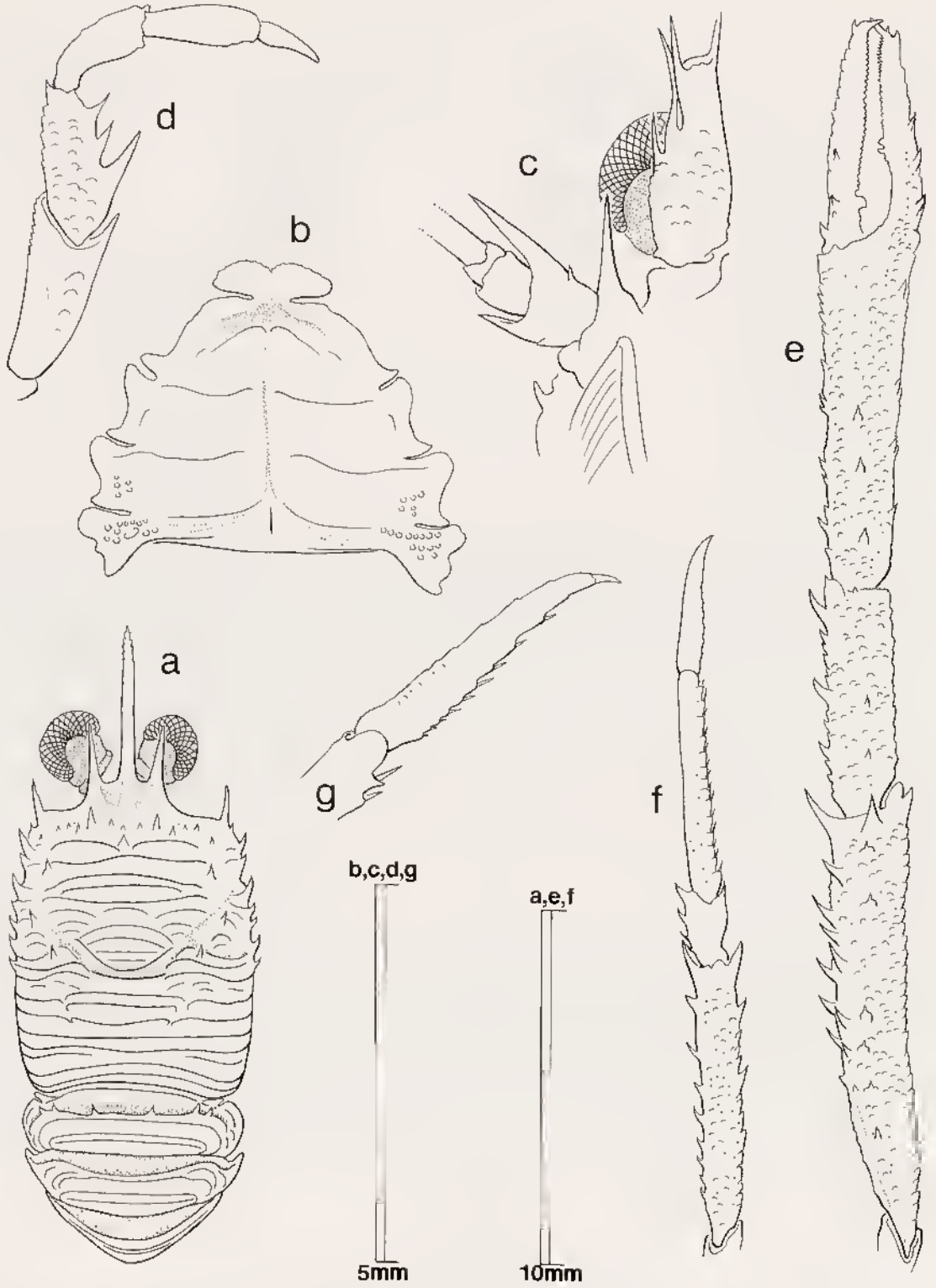

FIG. 59. — *Munida tyche* sp. nov., ♂ 7.4 mm, holotype from Stn 131 (CORAIL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

ETYMOLOGY. — From the Greek, *typhlos*, blind, in reference to the small cornea. The name is considered as a substantive in apposition.

DESCRIPTION. — Carapace with gastric region anteriorly elevated. Secondary striae present, anterior branchial region squamate. Intestinal region with scales. Gastric region with a row of 5 pairs of epigastric spines. No other spines on dorsal surface of carapace. Supraocular spines overreaching eyes. External orbital spine well developed, situated at anterolateral angle of carapace; second marginal spine smaller than preceding one situated at midlength of hepatic margin between first spine and cervical groove. Branchial margin with 5 small spines. Thoracic sternites without striae. Second abdominal segment with a row of 4 spines on anterior ridge. Second and third segments each with one transverse continuous striae; fourth and fifth segments without striae. Two pairs of gonopods on first and second abdominal segments. Eye small, cornea not dilated, maximum corneal diameter about 1/6 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) unusually large, distinctly exceeding cornea, distomesial spine distinctly shorter than distolateral. First segment of antennal peduncle with distomesial spine nearly reaching end of second segment; distomesial spine on second segment reaching end of third segment. Extensor border of merus of third maxilliped unarmed. Fixed finger of cheliped with several spines along proximal half of lateral margin and one subterminal spine; movable finger with proximal spine. Dactylus of walking legs slightly shorter than propodus, with movable spinules along entire ventral margin.

REMARKS. — *M. typhle* sp. nov. is closely related to *M. magniantennulata* Baba & Türkay, 1992, from thermal vents of Lau Basin (BABA & TÜRKAY, 1992; BABA & DE SAINT LAURENT, 1992). Both species are differentiable by several aspects :

— The supraocular spines distinctly overreach the cornea in *M. typhle*, not in *M. magniantennulata*.

— The distal spine on the basal segment of the antennal peduncle nearly reaches the end of the second segment in *M. typhle*, in *M. magniantennulata* this spine is very short and distinctly does not reach the end of this segment.

— The cheliped palm has one row of well developed dorsal spines and the fixed finger has several spines on the proximal half in *M. typhle*, these spines are absent in *M. magniantennulata*.

M. typhle is also close to *M. parvioculata* Baba, 1982, from SE Miyake-jima, 1105 m (BABA, 1982), differing in several features :

— The spines on the branchial margins are more developed in *M. parvioculata* than in the new species.

— The cheliped is densely setose in *M. parvioculata*, with few setae in the new species.

— The dactylus of the walking legs are slightly shorter than the propodus, instead of being half as long as in *M. parvioculata*.

DISTRIBUTION. — New Caledonia, between 1395 and 1470 m.

Munida urizae sp. nov.

Figs 61, 88

MATERIAL EXAMINED. — **New Caledonia**. CHALCAL 2 : stn 4, 253 m : 1 ♂ 7.2 mm (MNHN-Ga 3167). — Stn 18, 274 m : 47 ♂ 4.7 to 10.9 mm; 10 ov. ♀ 7.4 to 9.3 mm; 7 ♀ 4.0 to 8.9 mm (MNHN-Ga 3168). — Stn 19, 271 m : 1 ♂ 8.5 mm; 1 ov. ♀ 6.2 mm (MNHN-Ga 3169). — Stn 20, 230-300 m : 5 ♂ 6.0 to 10.0 mm; 5 ov. ♀ 8.0 to 9.0 mm (MNHN Ga 3170 and USNM). — Stn 26, 296 m : 2 ♂ 9.5 and 11.2 mm; 3 ♀ ov. 8.2 to 10.4 mm; 1 ♀ 5.3 mm (MNHN-Ga 3171). — Stn 27, 289 m : 4 ov. ♀ 7.7 to 8.2 mm (MNHN-Ga 3172).

SMIB 4 : stn 44, 270-300 m : 1 ♂ 8.2 mm; 1 ov. ♀ 7.5 mm (MNHN-Ga 3173).

SMIB 5 : stn 90, 340 m : 1 ov. ♀ 9.5 mm (MNHN-Ga 3174).

LAGON : stn 1153, 330 m : 2 ♀ 6.1 and 6.3 mm (MNHN Ga 3175).

Matthew and Hunter Islands. VOLSMAR : stn 39, 305 m : 1 ov. ♀ 7.7 mm (MNHN-Ga 3176).

Chesterfield Islands. MUSORSTOM 5 : stn 301, 487-610 m : 2 ♀ 3.6 and 7.4 mm (MNHN-Ga 3177).

TYPES. — One male of 10.0 mm from CHALCAL 2, Stn 20 (MNHN-Ga 3170) has been selected as holotype; the other specimens are paratypes.

Source : MNHN, Paris

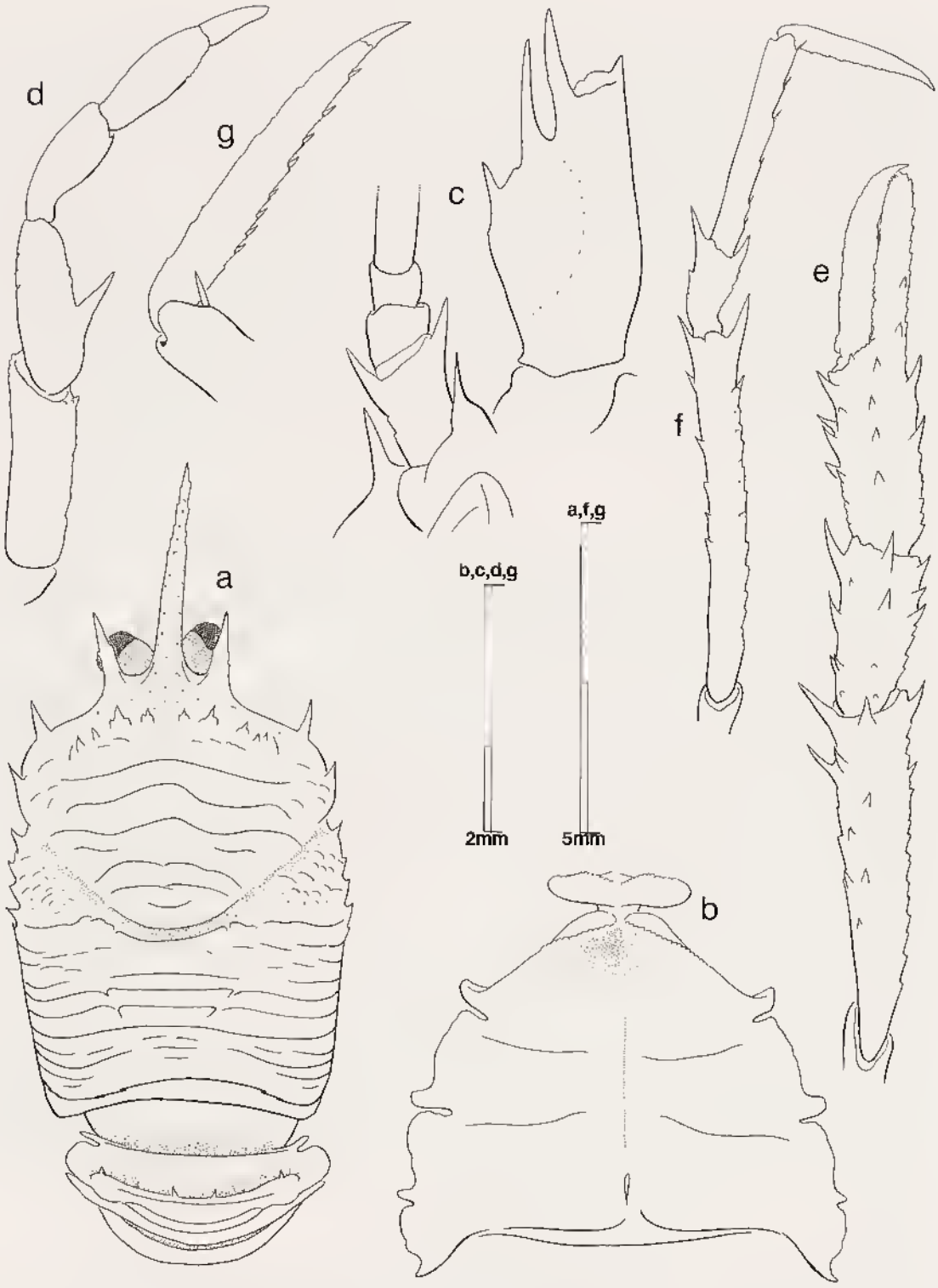

FIG. 60. — *Munida typhle* sp. nov., ♂ 6.9 mm, holotype from Stn 68 (BIOCAL) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

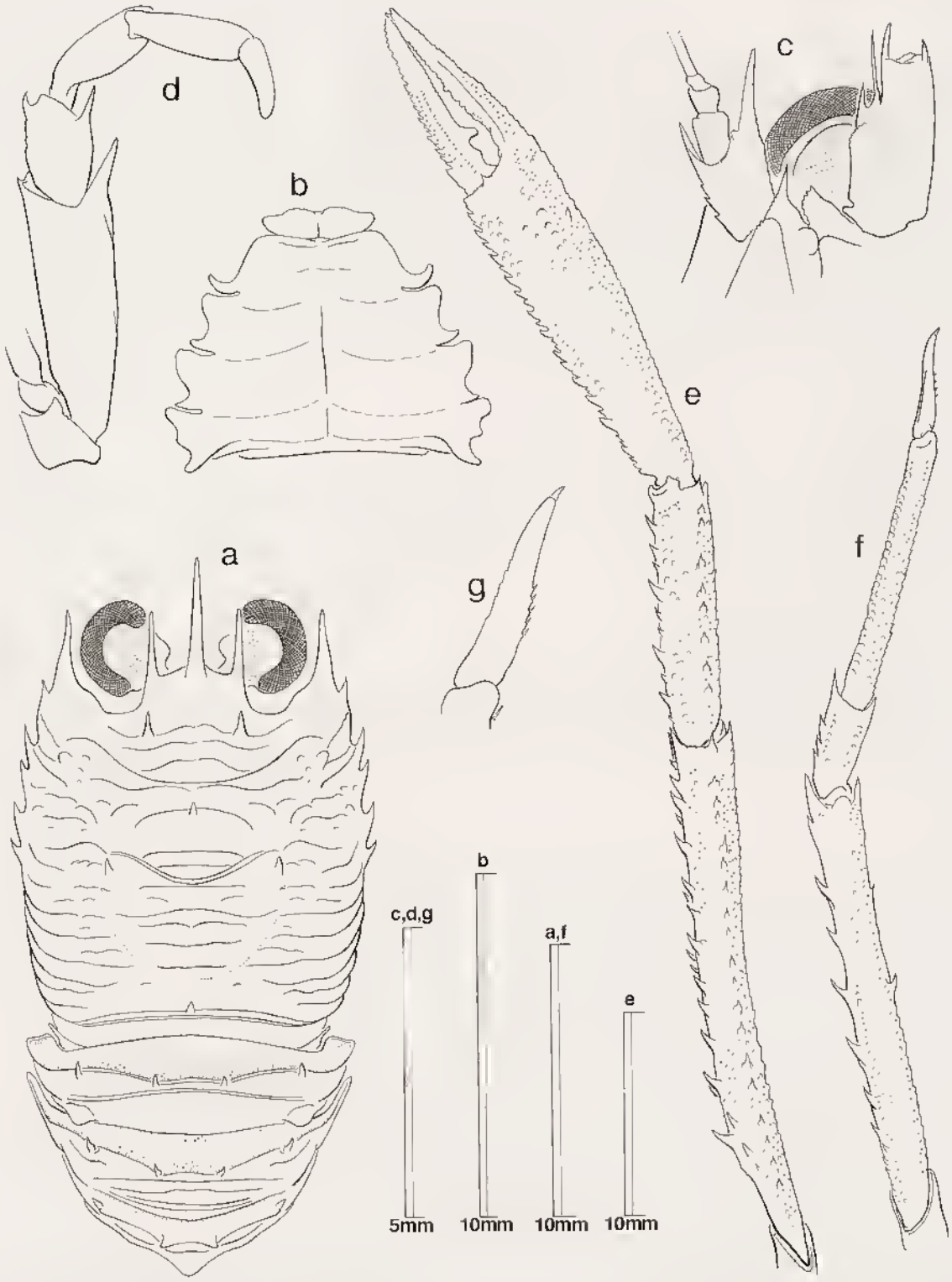

FIG. 61. — *Munida urizae* sp. nov., ♂ 10.0 mm, holotype from Stn 20 (CHALCAL 2) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, right cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

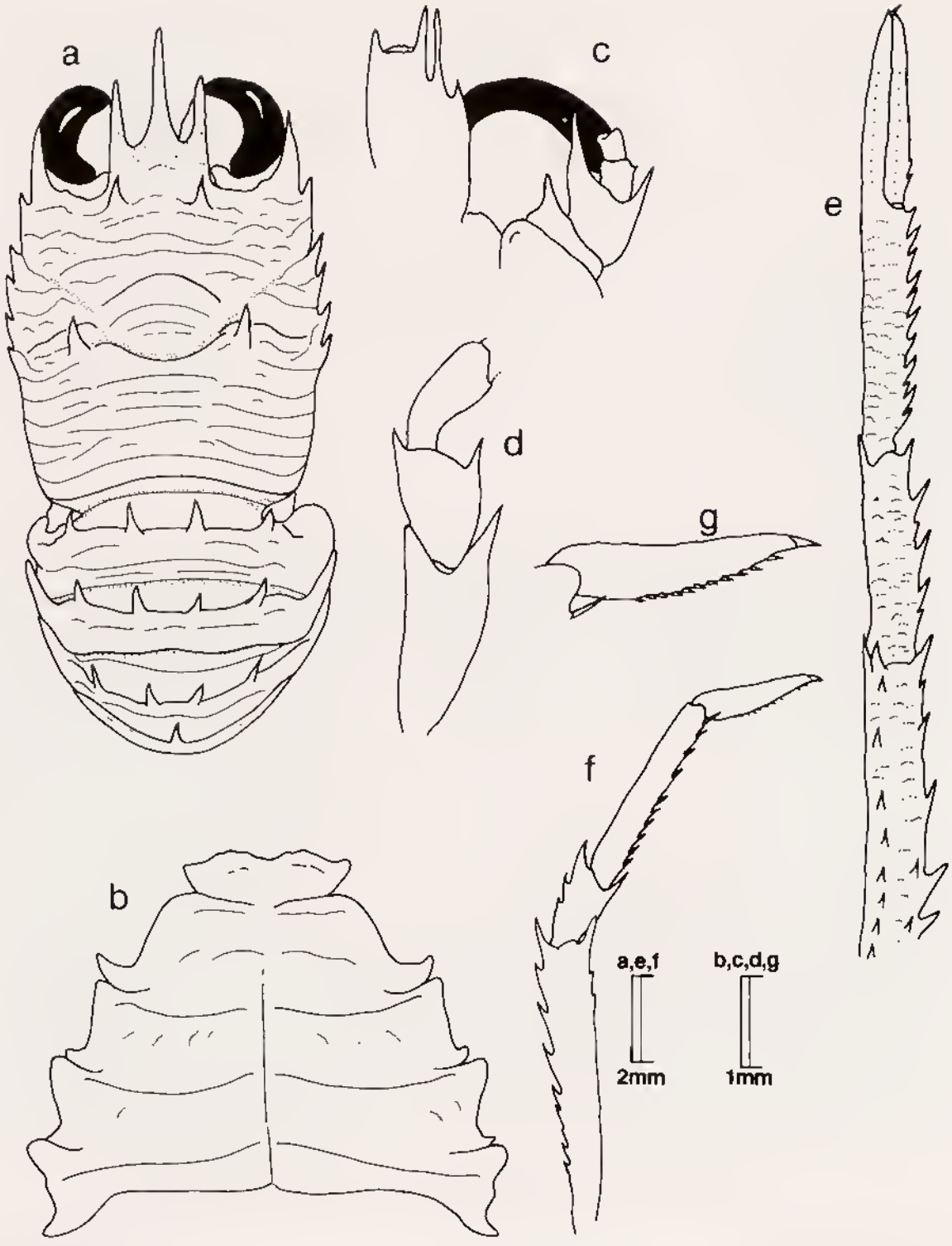

FIG. 62. — *Munida yante* sp. nov., ♀ 5.5 mm, holotype from Stn 178 (SMIB 8) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

ETYMOLOGY. — This species is dedicated to M. J. URIZ of the Centro de Estudios Avanzados, Blanes, for her important contribution to the taxonomy of sponges and support in my work.

DESCRIPTION. — Carapace with few secondary striae. Pair of epigastric spines behind supraoculars and median spine in anterior part of metagastric region. Postcervical spine on each side. Small median spine on posterior margin of carapace. Frontal margins concave. External orbital spine strong, situated at anterolateral angle of carapace, nearly reaching end of supraocular spines. Branchial margin with 4 spines. Fourth thoracic sternite with several short arcuate striae; fifth to seventh sternites smooth. Second, third and fourth abdominal segments each with 4 equal-sized spines on anterior transverse ridge; posterior ridge of fourth segment with median spine. Males with gonopods absent from first abdominal segment. Eye moderately large, maximum corneal diameter 1/3 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment (distal spines excluded) slightly exceeding cornea, distolateral spine longer than distomesial. Basal antennal segment with distomesial spine short, reaching midlength of second segment; distomesial spine on second segment exceeding peduncle; third segment spineless. Merus of third maxilliped with marginal spine near midlength of flexor border; extensor margin with small distal spine. Mesial and lateral borders of movable and fixed fingers of cheliped denticulated. Dactylus of walking legs less than half as long as propodus, ventral border with some median spinules.

COLOUR. — Ground colour of carapace pinkish; numerous yellow spots, circled by red, on gastric, anterior branchial, and cardiac regions and second abdominal segment; 2 purple spots on posterior part of gastric region; red spots on lateral parts of abdominal segments. Rostrum, supraocular and external orbital spines pinkish. Chelipeds and walking legs with red and pinkish bands; cheliped palm with distal half red; fingers with proximal 2/3 reddish, distal third whitish; dactylus of walking legs reddish.

REMARKS. — *M. urizae* is closely related to *M. yante* sp. nov. from New Caledonia. Both species have the frontal margins of the carapace concave, however, they differ in several aspects (see below).

M. urizae differs easily from the other species of the area by several important characters. The new species is characterized by the comparatively reduced fourth segment of the endopod of the third maxilliped (the merus in particular) as well as the reduced two distal segments of the antennal peduncle. On the other hand, the concave front margin laterally leading to the unusually external orbital spine is also unique to the species.

SIZE. — The males examined ranged between 4.7 and 11.2 mm, females between 3.6 mm and 9.5 mm; ovigerous females from 6.2 mm.

DISTRIBUTION. — New Caledonia, Matthew and Hunter Islands and Chesterfield Islands, between 230 and 610 m.

Munida yante sp. nov.

Figs 62, 97

MATERIAL EXAMINED. — **New Caledonia.** SMIB 8 : stn DW 178, 03.01.1993, 23°45.1'S, 168°17'E, 400 m : 1 ♀ 5.5 mm, holotype (MNHN-Ga 3555).

ETYMOLOGY. — The name refers to one of the Oceanids of the Greek mythology (Yante).

DESCRIPTION. — Carapace with few secondary striae. Pair of epigastric spines behind supraoculars. Postcervical spine on each side. Frontal margins concave. External orbital spine strong, situated at anterolateral angle of carapace, not reaching end of supraocular spines. Branchial margin with 4 spines. Fourth and fifth thoracic sternites each with several short arcuate striae; sixth and seventh sternites smooth. Second, third and fourth abdominal segments each with 4 equal-sized spines on anterior transverse ridge; posterior ridge of fourth segment with median spine. Eye large, maximum corneal diameter about 1/2 length of anterior border of carapace between bases of external orbital spines. Basal antennular segment (distal spines excluded) slightly exceeding cornea, distolateral spine longer than distomesial. Basal antennal segment with distomesial spine slightly overreaching

Source : MNHN, Paris

midlength of second segment; distomesial spine on second segment exceeding peduncle. Merus of third maxilliped with median marginal spine on flexor border; extensor margin with distal spine. Movable finger of cheliped with basal spine; fixed finger unarmed. Dactylus of walking legs about half as long as propodus, ventral border with spinules along entire length.

COLOUR. — Ground colour of carapace and abdominal segments red; small white spot on bifurcation of cervical groove. Tip of rostrum and spines of carapace and abdominal segments with white spots. Chelipeds and walking legs with red and white bands; fingers and distal half of palm red; dactylus of walking legs reddish.

REMARKS. — *M. yante* is closely related to *M. urizae* sp. nov. from New Caledonia, Matthew and Hunter Islands and Chesterfield Islands. They are easily distinguishable by the following aspects :

— *M. urizae* has a median spine on the metagastric region, absent in *M. yante*.

— The posterior margin of the carapace has a median spine in *M. urizae*, whereas this margin is unarmed in *M. yante*.

— The entire ventral margin of the dactylus of the walking legs bears spinules in *M. yante*; these spinules are restricted to the median portion in *M. urizae*.

— The colour patterns are different (see Figs 88 and 97).

Munida zebra sp. nov.

Figs 63, 89

MATERIAL EXAMINED. — **New Caledonia.** *"Vauban"* : 22°49'S, 167°12'E, 390 m : 1 ♀ 13.3 mm (MNHN-Ga 3178). — 22°54'S, 167°12'E, 395-410 m : 1 ♂ 14.6 mm; 1 ov. ♀ 14.0 mm (USNM). — Without position, 200 m, 13.10.1978 : 1 ♂ 11.7 mm (MNHN-Ga 3392).

BIOCAL : stn 45, 430-465 m : 1 ♂ 14.8 mm (MNHN-Ga 3180). — Stn 66, 505-515 m : 1 ♀ 5.3 mm; 1 juv. 4.0 mm (MNHN-Ga 3181). — Stn 67, 500-510 m : 5 ♀ 7.2 to 13.8 mm; 6 ov. ♀ 10.0 to 13.8 mm; 3 ♀ 7.7 to 17.8 mm (MNHN-Ga 3374). — Stn 83, 460 m : 1 juv. 3.8 mm (MNHN-Ga 3488).

MUSORSTOM 4 : stn 193, 430 m : 2 ov. ♀ 11.4 and 14.4 mm (MNHN-Ga 3182). — Stn 197, 560 m : 2 ♂ 11.0 and 12.8 mm; 2 ♀ 11.0 and 12.6 mm (MNHN-Ga 3376). — Stn 213, 405-430 m : 1 ov. ♀ 12.4 mm (MNHN-Ga 3183). — Stn 214, 425-440 m : 5 ♂ 12.1 to 14.6 mm; 1 ov. ♀ 16.0 mm (MNHN-Ga 3375). — Stn 215, 485-520 m : 1 ♂ 14.6 mm; 1 ov. ♀ 14.0 mm (MNHN-Ga 3377). — Stn 222, 410-440 m : 4 ♂ 10.5 to 14.9 mm; 1 ov. ♀ 10.7 mm (USNM). — Stn 228, 420 m : 1 ♂ 5.1 mm (MNHN-Ga 3378).

SMIB 1 : stn 7, 500 m : 2 ♂ 12.3 and 16.1 mm; 1 ov. ♀ 13.6 mm; 1 ♀ 12.0 mm (MNHN-Ga 3381). — Stn 9, 450 m : 1 ov. ♀ 14.8 (MNHN-Ga 3382).

SMIB 2 : stn 1, 438-444 m : 1 ♂ 11.2 mm; 1 ov. ♀ 12.8 mm (MNHN-Ga 3185). — Stn 2, 438-444 m : 1 ♂ 7.3 mm (MNHN-Ga 3186). — Stn 3, 428 m : 4 ♂ 11.8 to 13.8 mm; 1 ov. ♀ 13.8 mm (MNHN-Ga 3187). — Stn 5, 398-410 m : 1 ♂ 11.2 mm (MNHN-Ga 3188). — Stn 6, 442-460 m : 2 ♂ 9.0 and 12.8 mm; 3 ov. ♀ 12.1 to 14.8 mm (MNHN-Ga 3189).

CHALCAL 2 : stn 1, 500-580 m : 1 ♂ 15.3 mm (MNHN-Ga 3190). — Stn 2, 500-610 m : 5 ♂ 8.4 to 14.5 mm; 1 ov. ♀ 13.3 mm (MNHN-Ga 3191). — Stn 21, 500 m : 3 ♂ 10.5 to 13.5 mm; 3 ♀ 6.5 to 8.0 mm (MNHN-Ga 3379). — Stn 25, 418 m : 4 ♂ 11.8 to 18.5 mm; 3 ov. ♀ 12.0 to 16.0 mm; 1 ♀ 15.7 mm (MNHN-Ga 3380).

SMIB 3 : stn 1, 520 m : 9 ♂ 7.5 to 15.8 mm; 5 ov. ♀ 5.4 to 11.7 mm; 2 ♀ 7.1 and 9.2 mm (MNHN-Ga 3385). — Stn 3, 513 m : 11 ♂ 8.9 to 16.0 mm; 13 ov. ♀ 9.7 to 13.3 mm; 20 ♀ 5.5 to 11.6 mm (MNHN-Ga 3192). — Stn 5, 502-512 m : 1 ♂ 7.7 mm; 1 ♀ 10.0 mm (MNHN-Ga 3383). — Stn 6, 505 m : 1 ♂ 12.4 mm; 1 ov. ♀ 14.2 mm; 1 ♀ 7.5 mm (MNHN-Ga 3384).

SMIB 4 : stn 34, 510-515 m : 8 ♂ 6.1 to 15.2 mm; 5 ♀ 4.3 to 11.0 mm (MNHN-Ga 3458, 3196). — Stn 36, 530 m : 5 ♂ 6.3 to 13.8 mm; 1 ov. ♀ 12.2 mm; 1 ♀ 7.4 mm.(MNHN-Ga 3387). — Stn 37, 540 m : 3 ♂ 10.5 to 11.2 mm; 4 ♀ 6.5 to 15.5 mm (MNHN-Ga 3388). — Stn 38, 510 m : 7 ♂ 6.2 to 13.1 mm; 6 ♀ 9.3 to 12.6 mm (MNHN-Ga 3389). — Stn 55, 260 m : 2 ♂ 11.0 and 11.3 mm; 1 ov. ♀ 11.7 mm; 2 ♀ 9.5 and 10.8 mm (MNHN-Ga 3386). — Stn 65, 420 m : 1 ♀ 11.3 mm (MNHN-Ga 3197).

SMIB 5 : stn 98, 320-335 m : 1 ♂ 7.2 mm (MNHN-Ga 3390).

Loyalty Islands. Without position, 400 m, 03.03.1977 : 2 ♂ 14.0 and 15.2 mm (MNHN-Ga 3391).

MUSORSTOM 6 : stn 406, 373 m : 1 ♂ 12.0 mm; 1 ♀ 12.0 mm (MNHN-Ga 3193). — Stn 407, 360 m : 1 ♂ 13.5 mm (MNHN-Ga 3194). — Stn 464, 430 m : 2 ♂ 7.5 and 12.6 mm (MNHN-Ga 3195).

TYPES. — One male of 11.8 mm from SMIB 4, Stn 34 (MNHN-Ga 3196) has been selected as holotype; the other specimens are paralypes.

Source : MNHN, Paris

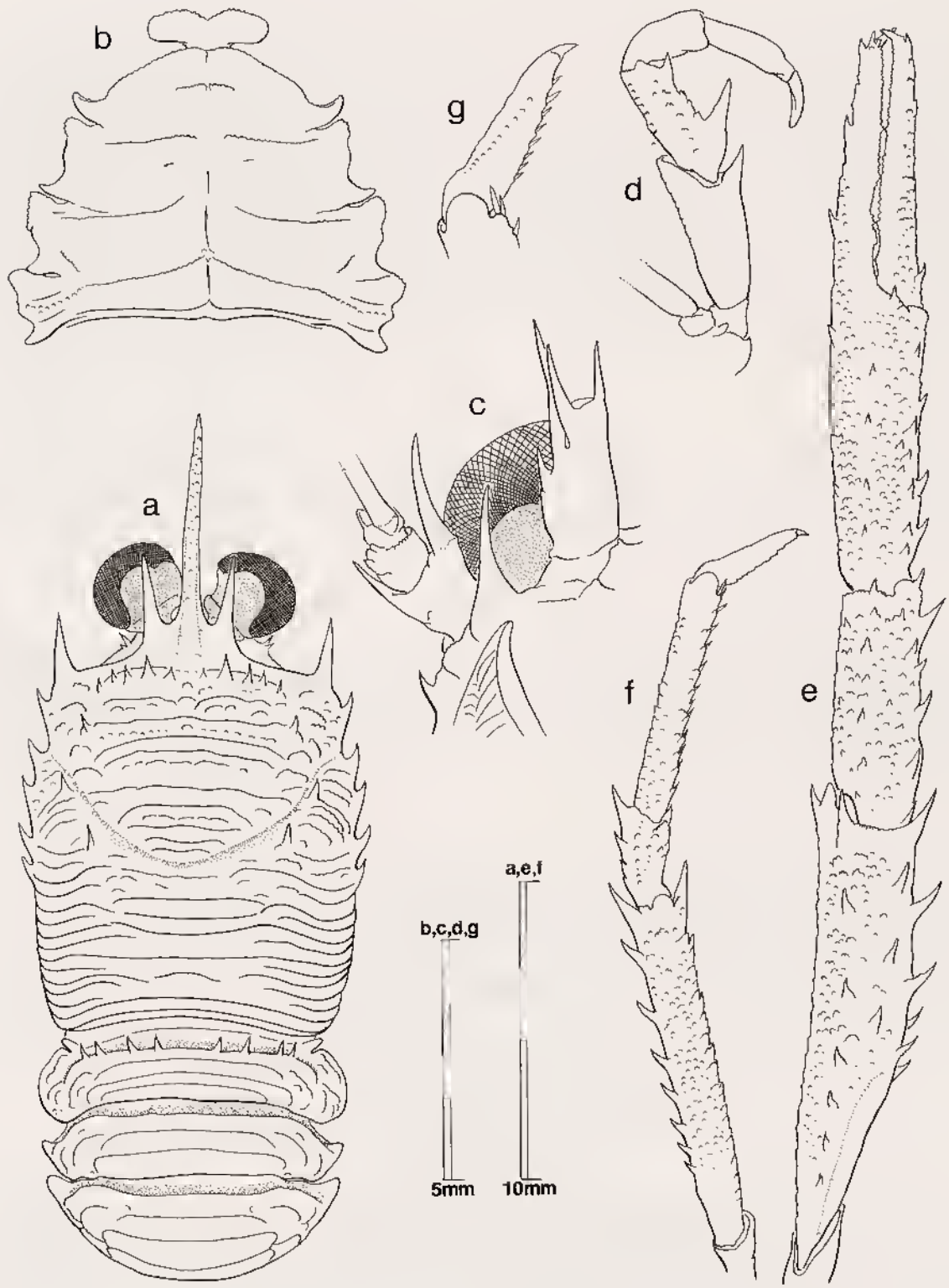

FIG. 63. — *Munida zebra* sp. nov., ♂ 11.8 mm, holotype from Stn 34 (SMIB 4) : **a**, carapace, dorsal view; **b**, sternal plastron; **c**, ventral view of cephalic region, showing antennular and antennal peduncles; **d**, right third maxilliped, lateral view; **e**, left cheliped, dorsal view; **f**, right first walking leg, lateral view; **g**, dactylus of right first walking leg, lateral view.

Source : MNHN, Paris

ETYMOLOGY. — The name *zebra* is refered to the zebra-like band colour pattern of this species.

DESCRIPTION. — Carapace with secondary striae between principal striae. Intestinal region with one scale. External orbital spine well developed, situated at anterolateral angle of carapace. Branchial margin with 4 spines. Fourth thoracic sternite with several short arcuate striae; fifth to seventh smooth. Second abdominal segment with a row of 4-5 pairs of spines on anterior ridge, occasionally only one median pair. Second segment with three continuous striae; third and fourth segments each with two continuous striae. Males with two pairs of gonopods on first and second abdominal segments. Eye large, maximum corneal diameter about 1/3 length of anterior border of carapace between bases of external orbital spines. Basal segment of antennule (distal spines excluded) reaching end of cornea, with 2 subequal distal spines, occasionally distomesial slightly longer than distolateral. First segment of antennal peduncle with strong distal spine on mesial margin exceeding second segment; distomesial spine on second segment exceeding antennal peduncle. Extensor border of merus of third maxilliped unarmed. Fixed finger of cheliped with several lateral spines; movable finger with one proximal and two subterminal spines on mesial border. Dactylus of walking legs half as long as propodus, with dorsal movable spinules along entire ventral margin.

COLOUR. — Carapace yellow, with purple bands : behind epigastric spines, along cervical groove and posterior zone of carapace; white spot behind rostrum and on first anterolateral spine. Distal part of rostrum and supraocular spines orange; proximal part of rostrum white. Spines on dorsal surface of carapace with reddish spot. Ground colour of second to fifth abdominal segment yellow, with one purple transverse band on each segment. Chelipeds and walking legs orange. Distal half of fingers of chelipeds reddish, red spots on merus and near base of movable finger. Dactylus of walking legs orange.

REMARKS. — *M. zebra* resembles *M. albiapicula* Baba & Yu, 1987, from Taiwan (BABA & YU, 1987), but differs in several features :

— The fixed finger of cheliped in *M. zebra* bears several lateral marginal spines other than the subterminals, the distal of which is absent in *M. albiapicula*.

— The ground colour of the carapace and the abdomen of *M. albiapicula* is orange, whereas *M. zebra* has yellow and purple bands.

M. zebra is also close to *M. erato* sp. nov, from New Caledonia and Chesterfield Islands. The two species can be distinguished by several characters :

— The basal antennular segment distinctly exceeds the cornea in *M. erato*, whereas this segment ends at the same level in *M. zebra*.

— Comparing specimens of similar sizes, the carapace and the abdominal segments have more striae in *M. erato* than in *M. zebra*.

SIZE. — The males examined ranged between 5.1 and 18.5 mm, females between 4.3 and 17.8 mm; ovigerous females from 5.4 mm.

DISTRIBUTION. — New Caledonia and Loyalty Islands, between 200 and 610 m.

Munida sp.

Figs 13b, 90

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4 : stn 159, 600 m : 1 ov. ♀ 11.6 mm (MNHN-Ga 3198). — Stn 200, 545 m : 1 ♀ 12.8 mm (MNHN-Ga 3199). — Stn 202, 580 m : 2 ♂ 8.2 and 9.5 mm; 2 ov. ♀ 12.9 and 14.8 mm; 2 ♀ 8.3 and 8.5 mm (MNHN-Ga 3479). — Stn 221, 535-560 m : 1 ♀ 5.7 mm (MNHN-Ga 3200). — Stn 238, 500-510 m : 1 ♂ 7.7 mm (MNHN-Ga 3201). — Stn 239, 470-475 m : 1 ♀ 10.7 mm (MNHN-Ga 3202). — Stn 241, 470-480 m : 2 ♂ 5.0 and 10.4 mm (USNM). — Stn 242, 500-550 m : 1 ♂ 14.7 mm (USNM).

CHALCAL 2 : stn 1, 500-580 m : 1 ♀ 13.3 mm (MNHN-Ga 3206). — Stn 73, 573 m : 1 ♂ 8.5 mm; 1 ♀ 7.3 mm (MNHN-Ga 3207). — Stn 74, 650 m : 1 ♀ 9.0 mm (MNHN-Ga 3208). — Stn 75, 600 m : 1 ♂ 5.0 mm; 1 ♀ 8.3 mm (MNHN-Ga 3209).

BIOGEOCAL : stn 308, 510-590 m : 1 ♂ 15.0 mm (MNHN-Ga 3393).

Source : MNHN, Paris

SMIB 4 : stn 34, 510-515 m : 1 ♀ 14.3 mm (MNHN-Ga 3212).
Loyalty Islands. MUSORSTOM 6 : stn 466, 540 m : 3 ♂ 10.4 to 12.0 mm; 1 ov. ♀ 13.7 mm; 5 ♀ 10.3 to 15.6 mm (MNHN-Ga 3210).

REMARKS. — This species is presently being studied by K. BABA (Kumamoto University, Japan) using specimens collected in northwestern Australia. It is closely related to *M. compressa* Baba, 1988, and *M. cornuta* sp. nov. from Kiribati (see above).

Munida sp. is easily differentiable from *M. cornuta* sp. nov. from Kiribati by the presence of numerous short striae on the thoracic sternites, and transverse striae on the abdominal segments. In *M. cornuta* the thoracic sternites are smooth and the abdominal segments have only 3 striae. On the other hand, the rostrum in *M. cornuta* is more upwardly directed than in *Munida* sp.

The ground colour of the carapace and abdominal segments is orange; the rostrum is orange with one red spot on the tip; the chelipeds and walking legs are orange; the fingers of chelipeds are red with white tips; dactylus of the walking legs whitish.

SIZE.— The males examined ranged between 5.0 and 15.0 mm; females between 5.7 and 15.6 mm; ovigerous females from 11.6 mm.

DISTRIBUTION.— The present material was collected in New Caledonia and Loyalty Islands, between 466 and 650 m.

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Source : MNHN, Paris

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Source : MNHN, Paris

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COLOUR PHOTOGRAPHS

FIG. 64. — *Munida acantha* sp. nov., ♀ paratype (6.0 mm). SMIB 6, Stn 118.
FIG. 65. — *Munida armilla* sp. nov., ♂ paratype (13.3 mm). SMIB 4, Stn 34.
FIG. 66. — *Munida bellior* Miyake & Baba, ov. ♀ (12.3 mm). MUSORSTOM 6, Stn 419.
FIG. 67. — *Munida callista* sp. nov., ♂ paratype (11.7 mm). BATHUS 3, Stn 814.
FIG. 68. — *Munida distiza* sp. nov., ♂ paratype (8.2 mm). MUSORSTOM 6, Stn 419.
FIG. 69. — *Munida distiza* sp. nov., ♂ paratype (8.2 mm). MUSORSTOM 6, Stn 419, ventral view.
FIG. 70. — *Munida eclepsis* sp. nov., ♀ holotype (11.0 mm). SMIB 4, Stn 34.
FIG. 71. — *Munida elachia* sp. nov., ♀ paratype (4.3 mm). CHALCAL 2, Stn 74.
FIG. 72. — *Munida eminens* Baba, ♂ (12.0 mm). MUSORSTOM 6, Stn 438.
FIG. 73. — *Munida guttata* sp. nov., ov. ♀ paratype (13.6 mm). SMIB 4, Stn 51.
FIG. 74. — *Munida incerta* Henderson, ♀ (17.5 mm). MUSORSTOM 6, Stn 466.
FIG. 75. — *Munida javieri* sp. nov., ♀ paratype (6.0 mm). SMIB 4, Stn 44.
FIG. 76. — *Munida leagora* sp. nov., ♂ paratype (11.4 mm). SMIB 4, Stn 38.
FIG. 77. — *Munida marini* sp. nov., ♀ paratype (24.2 mm). CHALCAL 2, Stn 21.
FIG. 78. — *Munida notata* sp. nov., ov. ♀ paratype (9.4 mm). MUSORSTOM 6, Stn 399.
FIG. 79. — *Munida ocyrhoe* sp. nov., ov. ♀ paratype (25.0 mm). SMIB 4, Stn 62.
FIG. 80. — *Munida olivarae* sp. nov., ♂ holotype (6.3 mm). MUSORSTOM 6, Stn 436.
FIG. 81. — *Munida rhodonia* sp. nov., ♂ paratype (13.3 mm). MUSORSTOM 6, Stn 470.
FIG. 82. — *Munida rosula* sp. nov., ♂ paratype (10.4 mm). MUSORSTOM 6, Stn 438.
FIG. 83. — *Munida rufiantennulata* Baba, ♂ (9.0 mm). MUSORSTOM 5, Stn 301.
FIG. 84. — *Munida spilota* sp. nov., ♂ paratype (7.6 mm). SMIB 4, Stn 42.
FIG. 85. — *Munida stigmatica* sp. nov., ♂ paratype (8.4 mm). SMIB 5, stn 84.
FIG. 86. — *Munida taenia* sp. nov., ♂ holotype (7.5 mm). SMIB 4, Stn 56.
FIG. 87. — *Munida thoe* sp. nov., ♂ paratype (12.4 mm). SMIB 4, Stn 34.
FIG. 88. — *Munida urizae* sp. nov., ♂ paratype (8.2 mm). SMIB 4, Stn 44.
FIG. 89. — *Munida zebra* sp. nov., ♂ holotype (11.8 mm). SMIB 4, Stn 34.
FIG. 90. — *Munida* sp., ♀ (14.3 mm). SMIB 4, Stn 34.
FIG. 91. — *Munida callirrhoe* sp. nov., ♂ paratype (14.6 mm). MUSORSTOM 6, Stn 412.
FIG. 92. — *Munida laurentae* sp. nov., ♀ paratype (14.8 mm). MUSORSTOM 6, Stn 466.
FIG. 93. — *Munida psamathe* sp. nov., ♂ holotype (5.8 mm). CHALCAL 2, Stn 73.
FIG. 94. — *Munida pseliophora* sp. nov., ♂ holotype (9.0 mm). MUSORSTOM 6, Stn 419.
FIG. 95. — *Munida sphecia* sp. nov., ♂ paratype (15.6 mm). MUSORSTOM 6, Stn 460.
FIG. 96. — *Munida squamosa* Henderson, ♀ (15.6 mm). MUSORSTOM 6, Stn 467.
FIG. 97. — *Munida yante* sp. nov., ♀ holotype (5.5 mm). SMIB 8, Stn 178.

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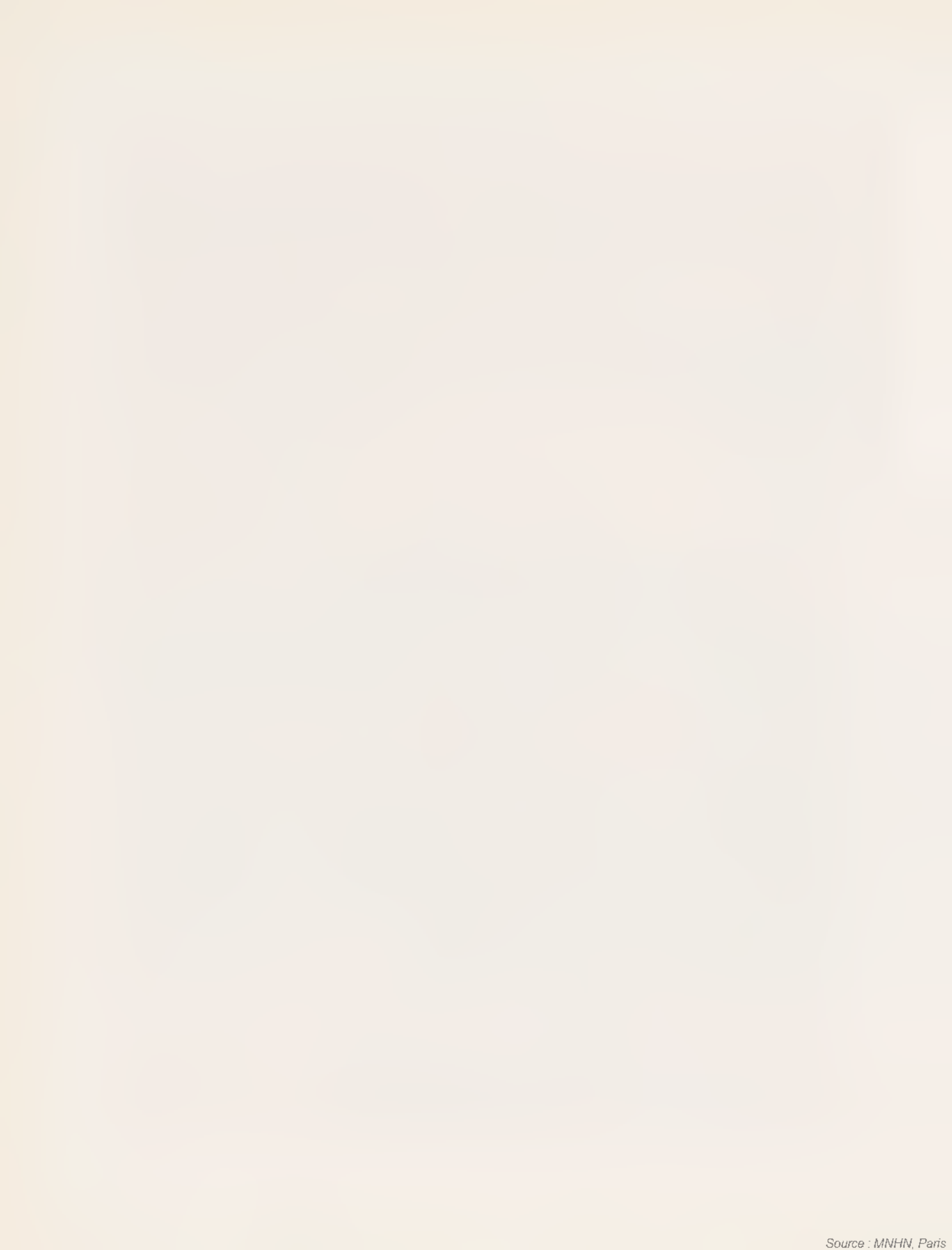

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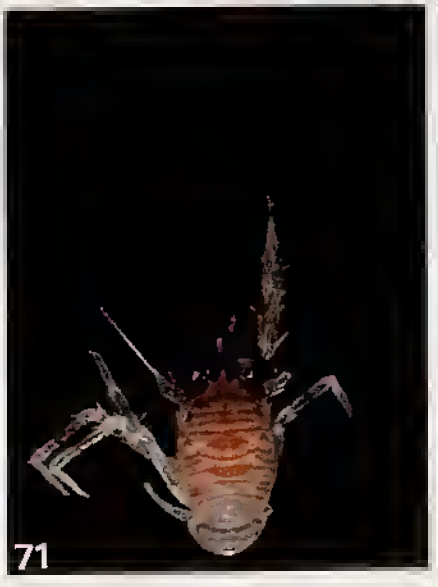
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